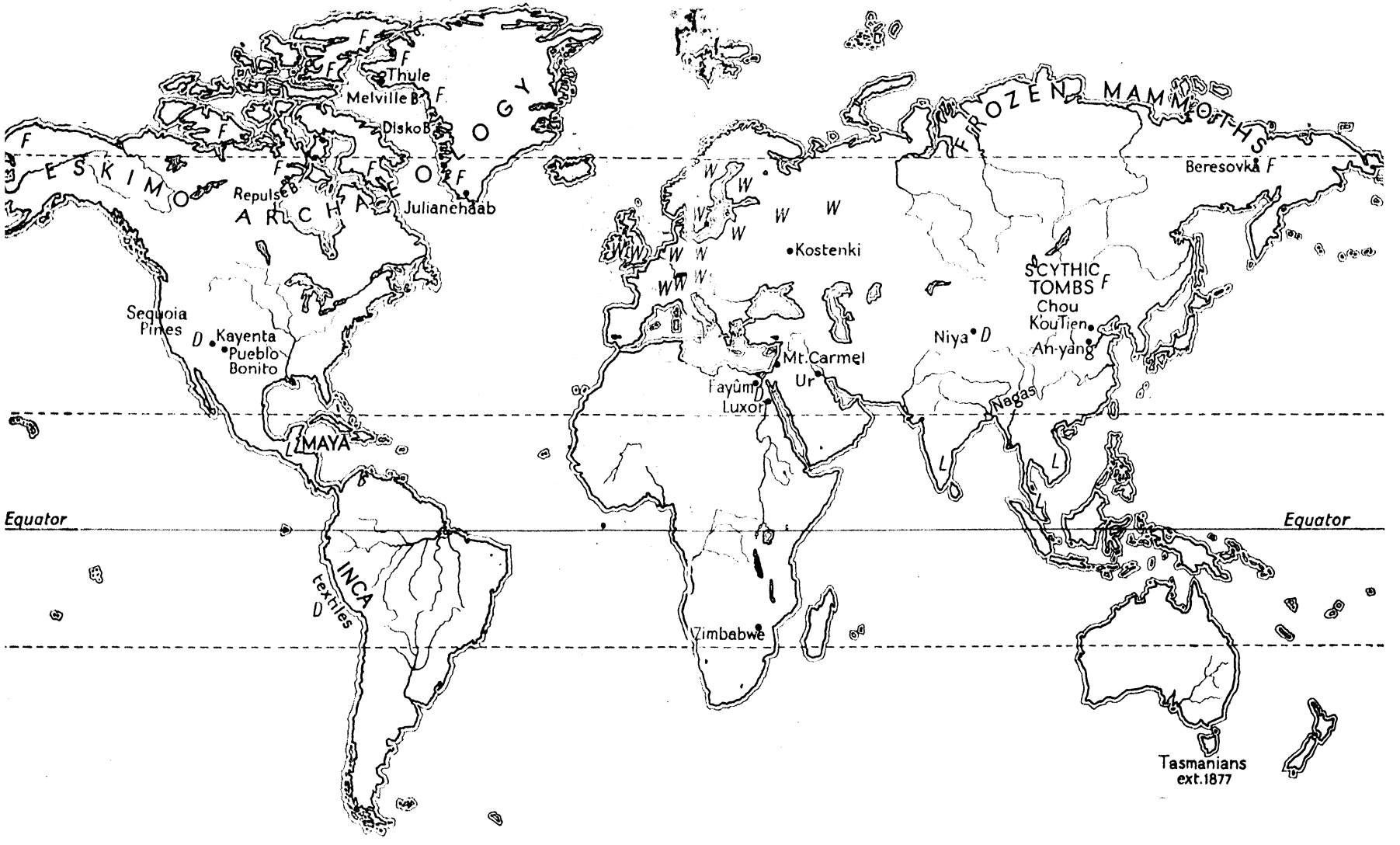

ARCHAEOLOGICAL SITES

F Frozen sites — *W* = Waterlogged sites — *D* = Desiccated sites — *L* = Leached sites

ARCHAEOLOGY AND SOCIETY

FIG. 1

Some of the chief European localities mentioned in the text

ARCHAEOLOGY AND SOCIETY

By

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With 24 Plates, 29 Illustrations in the Text and Endpaper Map

SECOND EDITION, REVISED

METHUEN & CO. LTD. LONDON
36 Essex Street, Strand, W.C.2

First Published . . *October 12th, 1939*
Second Edition, Revised *1947*

CATALOGUE NO. 3628/47

PRINTED IN GREAT BRITAIN

PREFACE TO SECOND EDITION

SINCE this book was first published in 1939, comparatively little has happened in the sphere of archaeology, but much in that of society. While, therefore, only minor corrections have been made to Chapters I–VI, the final chapter dealing with the relations of archaeology and contemporary society has been substantially rewritten. One general observation bearing on Chapter II may, however, be made, namely that under stress of war great strides have been made in the mechanization of excavation, a development which has complicated the already difficult task of salvaging antiquities brought to light in the course of public works. An example fresh in mind is the find made in 1943 at Llyn Cerrig Bach, Anglesey. It appears that quantities of peat were required for certain purposes and that this was obtained by disembowelling bogs, great masses being dragged on to adjoining high ground by scoops drawn by wire ropes from cable engines. The animal bones and Celtic metal-work comprising the find were recovered in the peat as it lay spread out for use. Not only were some of the objects damaged, but many no doubt are missing and the find as a whole, wrenched from its provenance, in all probability the bog known as Cors yr Ynys, has inevitably lost much of its value as an historical document.[1] During the period

[1] As Sir Cyril Fox himself has lamented in his masterly interim monograph, there is an 'almost complete lack of evidence . . . as to *how* and *why*' the objects came to be in the bog and, indeed, *when* they were so placed. *A Find of the Early Iron Age from Llyn Cerrig Bach, Anglesey*, p. 44. Cardiff, National Museum of Wales, 1945.

of reconstruction it is likely that mechanization will make further progress and this will call for special vigilance. Diffusion of archaeological knowledge among those engaged on public works is the most hopeful solution ; it was only thanks to the Clerk of Works concerned that the Anglesey find came to the notice of expert archaeologists.

As for the war itself, in the origins of which myth-ridden racialists played a conspicuous part, this has clarified the social relations of archaeology by emphasizing the evils of perverting research in the supposed interests of the State and by throwing into relief the anachronism of nationalistic aspirations and ideals, when pursued without relation to the general harmony. Archaeologists, and more especially those who study the prehistoric past common to the great mass of mankind, may help to foster that awareness of human solidarity without which it is difficult to conceive how any world order can be organized on a democratic basis. Yet it cannot be emphasized too strongly that the value of archaeological research must depend on its freedom from ulterior motives of any description. Prehistory must be cultivated like anything else of the highest excellence for its own sake. Only by single-minded pursuit of historical truth can valid results be achieved, and in the long run it is truth and not propaganda which influences society.

GRAHAME CLARK

CAMBRIDGE
November, 1945

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ACKNOWLEDGEMENTS

IT is my pleasant task to acknowledge the use of published illustrations from many sources, indications of which are given underneath the illustrations. I am particularly grateful to the following for supplying me with original negatives or prints: Major G. W. G. Allen, Miss G. Caton-Thompson, Professor V. G. Childe, Professor D. A. E. Garrod, Dr. A. E. van Giffen, Professor G. Hatt, Dr. Therkel Mathiassen, Mr. M. P. Mikkelsen, Dr. K. P. Oakley and Dr. R. E. M. Wheeler.

I have also to thank Professor E. H. Minns for his kindness in introducing me to the literature of the Scythic tombs of the Altai and Noin-ula Mountains, and Major Carl Nordenson of the *Föreningen för skidlöpningens främjande i Sverige* for information and literature on the subject of ancient forms of winter transport in Scandinavia.

The kindness of Professor V. G. Childe in reading through the last three chapters in typescript and of Professor J. H. Hutton in checking one of them in proof (Chap. VI) has removed several blemishes from the text.

Finally, the book owes more than I can say to the criticisms offered by my wife at every stage in its production.

G. C.

CHAPTER I

INTRODUCTORY

'I like the wide world of centuries and vast ages . . . mammoth worlds beyond our day, and mankind so wonderful in his distances. . . .'

D. H. LAWRENCE.

ARCHAEOLOGY is often defined as the study of antiquities. A better definition would be that it is the study of how men lived in the past. It is true that your archaeologist is compelled by circumstances to rely upon the material remains surviving from the people he is studying to arrive at any idea of their daily life; yet, however much he may appear to be preoccupied with things, often in themselves unattractive, he is really interested all the time in people. In this and many other ways he resembles the criminologist. He has to rely upon circumstantial evidence and much of his time is taken up with details which may appear to be trivial, although as clues to human actions they can be of absorbing interest.

The methods of archaeology are inherently the same whether applied to prehistoric or historic times, but the scope of the subject sometimes makes it convenient to separate the two fields. This book will be concerned primarily with prehistoric archaeology, although where necessary I shall not hesitate to draw upon examples from historic and protohistoric times. The absence or presence of written records is the criterion generally used in making the division, but any attempt to define the exact limits of prehistoric archaeology is bound to be arbitrary. Where written records are present

they vary immensely in their value to the investigator. At one end of the scale they may afford materials for a detailed history, whereas at the other they may consist of a few sentences in the works of some historian writing in a distant country. In some cases records may even exist which are indecipherable. The existence of clay tablets impressed with an unknown script does not prevent us from studying the Minoan civilization of Crete as if it was prehistoric. In our own country the Claudian Conquest (A.D. 43) is usually accepted as marking the end of our prehistoric period, although on the one hand there are references to Britain in classical writings of an earlier date, while on the other it might be argued that the light thrown by written history on the centuries of the Roman Occupation and still more on those which immediately succeeded it, is fitful and weak. In early centres of civilization such as the Euphrates and Nile valleys, where written records cover thousands of years, the upper limit of the prehistoric period is set back commensurately. On the other hand in regions like Australia and North America, which themselves produced no written records until the coming of the white man, the prehistoric period extends into comparatively modern times. There are a few corners of the world, albeit rapidly diminishing in size, which still exist to all intents and purposes in prehistoric times.

In his task of reconstructing the past without the help of documents the prehistorian suffers grievous disadvantages. For all his powers of detection he is for ever cut off from a knowledge of individuals ; he can track men down, but they remain anonymous. Yet, how often would a knowledge of some dynamic personality solve problems of prehistoric archaeology at present unexplained ! Although it can hardly be denied that to lose sight of the individual in the larger social unit is a serious loss, there are certain countervailing advantages. The situation in which the prehistorian finds

himself at least precludes him from dramatizing individuals in the manner so often affected by the literary historian. Further, in so far as his evidence is purely circumstantial it is free from all those defects of fallible humanity which impair the value of documentary evidence. That is one reason why history is an art. Flints and potsherds have no opinions, no interests; they are therefore susceptible to scientific treatment in a way that no written record can hope to be. If it be urged that prehistory is far less complete than history the obvious reply is that therein lies its principal appeal. Prehistory is indeed a young science on the threshold of its career.

Prehistory is also a popular science. This in itself is something that calls for explanation. Only yesterday 'British antiquities' were the concern of a limited circle of people generally regarded—when they were so much as noticed—by the general public as bores or cranks. Yet to-day archaeology not only has news value in the daily press—it has even become a vehicle for commercial advertisement. All this implies a veritable revolution in the public attitude towards archaeology. In keeping with this there has been a great change in its personnel. The old conception of archaeologists as constituting in themselves barely animate antiquities is quite out of date. Rowlandson's celebrated cartoon (1782) of a meeting of the Society of Antiquaries of London is now considered so far removed from any semblance to present reality that it hangs in an honoured place above the visitor's book in the Society's apartments at Burlington House. The very fact that you are reading a book about prehistoric archaeology is significant. Why are people more interested in archaeology in these days of rapid movement than they were ever in the more leisured past?

For this as for most other problems there are people who find a complete explanation in the developments of economic

history. The Industrial Revolution has been held responsible for the rapid development of archaeology in recent times, as it has been for very much else. Certainly the quickening of economic life, the building of factories, the growth of urban life with its deep foundations, its drains and its public works, the development of communications, canal-cutting and railway construction, and the intensification of agriculture to supply the needs of a rapidly increasing population must have brought antiquities to light as never before, while the profits from the new industries and more particularly from banking and finance, tended to increase the numbers of those with sufficient leisure to interest themselves in their preservation and study. All this is perfectly true, but like so many economic interpretations it is only a half-truth. The Industrial Revolution merely intensified processes which have been at work since the beginning of history. Ever since men have cultivated the soil they must have disturbed the remains of pre-existing civilizations; indeed, as will be shown in Chapter II, agricultural pursuits have probably been as prolific over a period time as any others. The fact is that for centuries such opportunities were neglected. The thought of what was heedlessly destroyed during the first eighteen or nineteen centuries of our era (and for that matter of what is now being destroyed through ignorance every day in our own country) is a harrowing one, but it reinforces my point that no mere increase in opportunity can be held responsible for the astonishing development of interest in archaeology during the last hundred years. It was only when people were able to realize the significance of what was brought to light in the ordinary course of events that they made use of the opportunities presented. Neither the opportunity nor the leisure could have availed anything without radical changes in the realm of ideas.

Broadly speaking the most significant of these coincide with the two main phases into which the development of

prehistoric archaeology in this and neighbouring countries can be divided. During its first period, when archaeology was almost exclusively the pastime of country gentlemen, a kind of bloodless field-sport, the most important formative influence was that profound revolution in taste known as the Romantic Movement. In its second period, dating from round about 1860, which saw the gradual transition of archaeology from a pastime to a science with an acknowledged status, its own methods and its band of trained workers, the dominant influence has been the application of the conception of Evolution to the study of human origins and historical development.

Like all changes in taste the Romantic Movement cannot be precisely dated, but, whereas in 1720 people still judged things excellent in so far as they approached classical models, a hundred years later the barbarian had become fashionable, the classical stilted and outmoded. Thus noble families and collegiate foundations, which in 1720 were patronizing the architects of classical temples, by 1820 would be found erecting monuments to the Gothic revival, while the Lake District, hitherto accounted barbarous and uncivilized, by the end of the century would be revered as the seat of the country's most respected poet. The effect of this change upon men's appreciation of vestiges of the past was profound. The sherds, tumuli and 'flint weapons' of their native land, from being objects of polite indifference or disdain, became as a result of the change in taste the cynosure of excited admiration.

As long ago as 1587, it is true, Camden had published his *Britannia*, but this was essentially a compilation from mediaeval sources. The first man of note to travel about and observe British antiquities in the field was John Aubrey (1626–97), whose *Monumenta Britannica*, which exists in the Bodleian in manuscript form, still yields information of value to the modern archaeologist. But Aubrey was an isolated, if out-

standing individual, who was really born before his time. It was William Stukeley who came at the right moment to set a fashion. His *Itinerarium Curiosum*, written ' to oblige the curious in the Antiquitys of Brittan ' and comprising ' an account of places and things upon inspection, not compil'd from others labors, or travels in ones study ', was published in 1724, to be followed in 1740 by *Stonehenge* and in 1743 by *Abury*.

From riding about the country-side in search of antiquities to dismounting and digging was but a short step. As a general rule the country gentleman chose to dig barrows as being easy to find and liable to yield the richest spoil with the minimum of effort. Accordingly the period from the middle of the eighteenth till three-quarters through the nineteenth century was one of very great activity in barrow-digging. In Kent, the Rev. Bryan Faussett; in Dorset, Charles Warne; in Derbyshire, the two Batemans (father and son); in Yorkshire, Canon Greenwell and J. R. Mortimer; in Cornwall, the Rev. W. G. Lukis and W. C. Borlase; and in Wiltshire, William Cunnington and Sir Richard Colt Hoare were notable barrow-diggers, men who, much as we must regret the evidence irretrievably destroyed by them, were fired with real enthusiasm and whose results, summarized by John Thurnam in his classic paper on ' Ancient British Barrows ' (*Archaeologia*, XLII), laid the foundation for future work.

An interesting side-light on the Romanticism which fired the pioneer endeavours of the early barrow-diggers is thrown by their preoccupation with Druids. The ' white-haired Druid bard sublime ' of Sir Richard Colt Hoare's *Ancient Wiltshire* (1812) was as unclassical a figure as could easily be imagined, while Mr. Miles's meditations in his *Deverel Barrow* (1826) on ' rude but solemn rites ', a ' blazing pile flinging its lurid beams around ', ' mystic songs of bards ', ' frantic yells '

and 'wild piercing shrieks of expiring victims' can soberly be described as wildly romantic. From the first it was megalithic structures of all kinds that were accounted favourite haunts of Druids, and to this day Stonehenge is the annual scene at midsummer's dawn of a Druidical performance enacted in all seriousness by robed figures.[1]

The foundation of archaeological societies was one of the tangible results of the movement. The Society of Antiquaries of London was reconstituted in 1717, was granted a royal charter in 1751 and issued its first volume of *Archaeologia* in 1770. In the provinces the activities of the barrow-diggers, together with the growing interest in Gothic architecture, led to the foundation in the forties and fifties of the nineteenth century of many of the county archaeological societies which still survive to carry on their good work.

Yet, although by the middle of the century excavations for prehistoric antiquities were being conducted by many people up and down the country and although these researches had fostered the development of organizations for their pursuit, archaeology remained exclusively the pastime of leisured folk, having no pretensions to a science. Moreover, it was limited in scope to the relatively recent stages of human history. The modern conception of the antiquity of man was still undreamt of, though soon to break upon the world.

The publication of the *Origin of Species* drew a hard and indelible line across the pages of history. Its immediate effect upon thoughtful people was to focus attention upon human origins as a problem for research. The very year (1859) in which Darwin's book appeared Prestwich and Evans paid that visit to Abbeville and Amiens made famous by their acceptance before the Royal Society of the daring claim of Boucher de Perthes to have found flint implements of human

[1] For further reading see: T. D. Kendrick, *The Druids*, chap. 1, London, 1927; also Stuart Piggott in *Antiquity*, 1937, 31.

workmanship in geological deposits of an age hitherto dismissed as incredible. In 1863 Lyell opened his book on *The Geological Evidences of the Antiquity of Man* with the declaration that 'no subject has lately excited more curiosity and general interest among geologists and the public than the question of the Antiquity of the Human Race—whether or no we have sufficient evidence in caves, or in the superficial deposits commonly called drift or "diluvium," to prove the former existence of man with certain extinct mammalia'. In the same year Huxley closed his famous essay 'On some Fossil Remains of Man,' in which he accepted the contemporaneity of the original Neanderthal skull and at the same time insisted upon its human characteristics, with the words 'we must extend by long epochs the most liberal estimate that has yet been made of the Antiquity of Man.'

Premonitions of the impending revolution in thought had been felt for some years before the publication of *The Origin of Species*. As long ago as 1797, John Frere, F.R.S., claimed in his communication to the Society of Antiquaries that certain flints 'fabricated and used by a people who had not the use of metals' had been obtained from a brick-earth in which 'were found some extraordinary bones, particularly a jaw-bone of enormous size, of some unknown animal, with the teeth remaining in it'. His conclusion that 'the situation in which these weapons were found may tempt us to refer them to a very remote period indeed; even beyond that of the present world' was prophetic, but attracted little attention at the time. As the years passed other discoveries were made, but these also were either ignored or quietly suppressed, not because the leading scientists of the day were dishonest, but simply because their preconceptions were too strong for them. It is worth noting that it was the amateurs like Frere and M'Enery, the discoverer of flint implements associated with the bones of extinct animals in Kent's Cavern, who most clearly perceived

the meaning of what they had seen, while the professional geologists, of whom Dean Buckland was outstanding, proved themselves the most conservative and obtuse.

The case of Dean Buckland (1784–1856) is instructive. The first Reader in Geology at Oxford and perhaps the most eminent geologist of his day, he contrived at the same time to hold a Studentship at Christchurch and the Deanery of Westminster. The dedication of his most important book, published in 1823, was fulsome in the best tradition of the previous century and significantly enough was addressed to the Honourable and Right Reverend Shute Barrington, LL.D., Lord Bishop of Durham. Its full title—*Reliquiae Diluvianae; or Observations on the organic remains contained in Caves, Fissures, and Diluvial Gravel and on other Geological Phenomena attesting the action of an Universal Deluge*—gives some foretaste of the author's general attitude of mind. Entirely typical was his treatment of one of his own discoveries, the so-called 'Red Lady' of Paviland, actually a male skeleton covered in ochre and accompanied by ivory rods and bracelets. To-day the 'Red Lady' is recognized as the first ceremonial burial of Upper Palaeolithic Age to be discovered, but to Dean Buckland she was '*clearly* not coeval with the antediluvian bones of the extinct species' with which her remains were found. To dissociate the skeleton from inconvenient surroundings the Dean decided to connect it with 'the remains of a British camp existing on the hill immediately above (the) cave'. As he thoughtfully pointed out: 'whatever may have been her occupation, the vicinity of a camp would afford a motive for residence, as well as means of subsistence in what is now so exposed and uninviting a solitude'. His conclusion that the date of the 'Red Lady' 'is coeval with that of the military occupation of the adjacent summits, and anterior to, or coeval with, the Roman invasion of this country' followed quite simply. By such sophistry was the 'Red Lady' of Paviland

'rejuvenated by some 20,000 years.' After this it is hardly surprising to read that

> the discovery of human bones incrusted with stalactite, in a cave of mountain limestone at Burringdon, in the Mendip-hills, . . . is explained by this cave having either been used as a place of sepulture in early times; or resorted to for refuge by wretches that perished in it, when the country was suffering under one of the numerous military operations, which, in different periods of our early history, have been conducted in that quarter . . . The state of the bones affords indication of very high antiquity; but there is no reason for *not* considering them postdiluvian (my italic).

Now Dean Buckland was a very able person and an honest man, but he was wearing blinkers. It was impossible for him, a man of trained observation, to accept associations of human remains with the bones of extinct animals of which he himself was the discoverer, owing, as he himself tells us in his *Geology and Mineralogy considered in relation to Natural Theology* (1836), to the 'great difficulty in reconciling the early and extended periods which have been assigned to the extinct races of animals with our received chronology'. The supposed irreconcilability of quaternary man with the Bible, and his certain incompatibility with Archbishop Ussher's chronology was sufficient to preclude his existence.

It is difficult for us to-day to appreciate the sweeping nature of the changes in men's attitude to the world that followed the general acceptance of the idea of evolution. The difference in outlook between Buckland and Huxley is so great that it seems hardly credible that they could have belonged to successive generations of scientific leaders. There never had been in the history of the world such a chasm as yawned in 1859. The fundamental conception that all forms of life have developed during vast periods of time is one that undermined all 'received' ideas and chronologies and at the same time opened up limitless fields for research. In abolishing the

'received' version of a comparatively recent creation of man the evolutionists not only cleared the way for research into the origins of mankind and the development of his civilization —they made it a compelling necessity. Among professional scientists, as already shown, the challenge met with an immediate response, but from the first also it attracted a wide and ever-growing popular interest: so human and intimate were the questions involved that it could hardly have been otherwise. Once granted, the general idea of growth, and man himself, his social and economic organization and all the impedimenta of his life, his houses, furniture, implements, weapons and clothes were seen to be phenomena of time as well as of place. An interest in the past thus became a necessary complement of life in the present.

The idea of evolution was accepted and widely applied at a time of unprecedented economic progress. Prehistoric archaeology in its modern form, indeed, has grown up during a period which has witnessed a greater increase in the mastery of nature than any other in the world's history. Knowledge of the past seems to have kept pace with knowledge of the present. It is as though, conscious of the weight of the towering edifice of his creations in the material world, modern man has been anxious to deepen the foundations of his civilization in the past. The need for some kind of philosophical background for material achievements was met in large measure by the Victorian idea of progress, a simple idea easily popularized and one that received apparent sanction from the idea of evolution in the realm of biology. Viewed from this angle the development along scientific lines of prehistoric archaeology was no mere logical outcome of the enunciation of evolutionary principles, as urged by men like Huxley and Lyell: it was a great popular necessity, for it was prehistoric archaeology alone that was and is able to provide evidence for the ascent of humanity. It is true that to-day we no longer

regard the progress of mankind with quite the assurance of our Victorian forebears, and it may be that we are more ready to acknowledge dips and even troughs in the general upward curve, but the broad fact of technical progress when viewed from the dawn of the Stone Age is undeniable. If Mr. Wells's *Outline of History* owed much of its brilliant success to the public appetite for 'progress', it is worth noting that such a book could certainly not have been written without the help of prehistoric archaeology.

CHAPTER II

DISCOVERY

HOW does an archaeologist know where to dig? That is a question which invariably comes to mind as we watch an ancient site come to life again in the hands of an excavator, or admire his finds arrayed in a museum case. The earth is full of accumulated evidences of successive civilizations, but how does the archaeologist know just where to put his spade to reveal them most easily and to best advantage?

The clues that lead to discovery are too numerous for a complete answer to be attempted here, but broadly speaking finds are made in one of three main ways:

(i) by noticing antiquities exposed casually through erosion or human activities;

(ii) by observing surface indications, such as relief, soil colour, and plant and animal ecology; and

(iii) by following up the innumerable clues offered by books, maps, place names and local lore.

EXPOSURE

Erosion and other natural forces. Much of the material of archaeology lies buried in the earth without leaving the slightest trace on the surface. Most of it remains to be found, but such as has come to light is generally revealed either by natural processes or the ordinary economic activities of man. It must always be remembered, however, that such opportunities are only transformed into discoveries through the agency of an observer. Put in another way, he who wishes to make

discoveries should watch the soil, wherever its surface is broken. It is hard to know what proportion of possible finds is lost, but that it is a high one is shown by the effect that one keen observer can have in increasing the antiquities of a district over quite a short period of time.

Of the various forms of natural erosion which come to the aid of archaeology erosion by the sea is one of the most important. The part played by the cliff exposures at Cromer and elsewhere on the Norfolk coast in the development of Palaeolithic studies in Britain has been very great. One cannot forget, either, that industries of the Lower Palaeolithic 'Clactonian' flake culture were first exposed in Pleistocene deposits on the foreshore at Clacton and Lion Point, Essex. Incidentally, the same stretch of coast has yielded quantities of archaeological material dating from Neolithic times.

Where the sea is eroding rapidly land which once supported a relatively dense population, archaeological material is continually being exposed in the cliffs, washed on to the foreshore and, unless rescued, destroyed by the waves. At Selsey Bill the process is in full swing, but fortunately a careful watch is kept there and an impressive collection of material has been salvaged in the last few years, including Mesolithic axes and microliths, a Neolithic cooking-hole full of pottery, two gold bracelets and a number of cinerary urns of the Late Bronze Age, Early Iron Age pottery, numerous gold coins minted by the Regni, and an Anglo-Saxon settlement.

The fact that rivers have ever attracted human settlement to their banks makes it easy to understand why their powers of erosion can so often be turned to good account by archaeologists. Thus we owe the discovery of Vinča, possibly the most famous prehistoric site in the Balkans, to the erosive action of the Danube, which, cutting into the tell, revealed a section of the successive settlements some nine metres thick. To quote a lesser instance from nearer home, one of the best

preserved bowls of the British Neolithic 'B' culture was noticed by an angler sticking out of a bank of the Thames near Hedsor!

Wind erosion, especially when operating on sand-dunes, is another friend of the archaeologist. When the surface of a dune overlying old land-surfaces settled by prehistoric man is broken and the wind starts to erode a hollow, the fine sand blows away and the heavier objects, including material left behind by early man, are left on the floor. This has happened on a big scale on Risby Warren, near Scunthorpe, a region densely settled by Mesolithic and later by Bronze Age man. Collectors searching among the dunes have reaped a rich harvest of worked flints, bronzes and potsherds, and occasionally the blowing wind has left isolated, on a stretch of old surface, little stone-ringed hearths. Wind erosion has been responsible for the discovery of more Mesolithic sites over a wide stretch of north-western Europe from Britain to Poland than any other factor. Sometimes the blowing sands reveal more than just hearths and loose finds. It was a great storm in the middle of the nineteenth century that, sweeping away some sand-dunes at Skara Brae in Orkney, revealed the famous stone-built village about which I shall have more to say later (p. 88 and pl. XI).

Exceptional droughts, by lowering the levels of lakes and rivers, have often revealed sites normally obscured from view. The extraordinary drought and prolonged cold of the winter of 1853–4 caused the rivers and lakes of the Alpine region to sink to their lowest recorded levels. On the banks of the Rhine, the Aar and the Limmat wooden structures of Roman age were revealed, while at Meilen on Lake Zurich the remains of a lake dwelling of much greater antiquity were fully exposed. As long ago as 1829 piles and other antiquities had been found near the site during excavations to deepen the harbour, but little attention was paid to the discovery at the

time: the revelation of 1853–4 was far more striking and interest in such matters was already much more advanced. The discovery of the Swiss lake-dwellings, coming as it did at a time when interest in archaeology was quickening all over western Europe, had an extraordinary effect. The completeness with which the wooden structures were found, thanks to their submersion beneath the lake waters, and the extraordinary state of preservation of food-waste and objects and utensils of all kinds, of materials rarely preserved from remote antiquity, captured people's imagination and stimulated the discovery of similar sites as far afield as Britain.

Human activities. Although Nature sometimes goes out of her way to help archaeology, the normal activities of human life create more opportunities than any other factor. It seems that the soil is so rich in history that man has only to scratch it to bring forth vestiges of his ancestors. From the earliest times the ploughman has been the unwitting discoverer of archaeological remains, and to this day ploughed fields are the happy hunting grounds of budding collectors. As a rule of course it is only sturdy objects like worked flints or bronzes that one can hope to find on ploughed land; only on occasions of extra deep ploughing or when heath or pasture land is being broken to the plough for the first time can pottery or bones be expected. Sometimes it happened in the past that, when new land was enclosed, 'obstructions' in the form of ancient monuments were removed and on such occasions antiquities frequently came to light. This applies especially to stony countries like Wales and Scotland where boulder cairns must often have presented tiresome and insuperable obstacles to husbandry. On chalk or gravel subsoils, where it was practicable to plough over barrows, these were commonly ploughed down gradually to the mere crop-marks observed by modern airmen. Although so often carried out, a piece of Lincolnshire folk-lore, attaching to a long barrow that once

existed at Adam's Head in the parish of Ludford Magna, suggests that the proceeding was sometimes viewed with a certain apprehension; a passage recording the folk-lore runs as follows:

> Along the High Street above Adam's Head (the source of a certain beck is so called) runs a long detached mound called the Giant's Grave. After lying for generations in neglect a neighbouring farmer ploughed and sowed wheat upon it, but nothing came up; not to be beaten he next year sowed potatoes on it; not one ever grew. In despair it is now abandoned to the grass and moss with which it has for centuries been covered by Nature.

Yet some farmer must have braved the qualms of his neighbours and ploughed the barrow flat, because no sign of it remains to-day.

Many of the methods employed to keep arable land in good condition have contributed their quota to archaeological discovery. The cutting of ditches and the laying out of drains are always worth watching. In regions like the East Anglian Fens where draining is carried out on an extensive scale its contribution has been especially notable. A large proportion of the fenland bronzes preserved at Cambridge were found in this way. Another important effect of drainage works in a fenland region is the general lowering of the surface due to contraction of the peat. This process, which is often a rapid one, has brought to light large numbers of Bronze Age settlement sites in the East Anglian Fenland as well as innumerable flint implements and bronzes. Sometimes the contraction of peat resulting from drainage works will even expose complete field monuments to view, as happened in the Kehdinger Moor, nr. Stade, Hanover, in 1913, when the lowering of the peat surface revealed some horizontal stone slabs. Excavations carried out after the Great War showed them to be the top stones of megalithic chambers

dating from the late Stone Age. In the same moor no less than a dozen round barrows were revealed through the same cause.

Another practice which has led to many discoveries in the fens is that of claying the land to fatten the peaty soil. As the peat directly overlies a thick bed of clay, popularly known in the fens as 'buttery clay' from its consistency, the method followed is to dig through the peat into the clay which is then thrown out and scattered on the land. Fifty years ago it was usual to dig quite small bell-shaped holes at intervals, but the modern method of trenching is more favourable to archaeological discovery. Most of the bronzes from the fens not ploughed up or found during drainage operations have been recovered by claying gangs.

The excavation of coprolites[1] for manure has also yielded its archaeological harvest. In Cambridgeshire the coprolites lie at the base of the lower chalk, where they occur in a seam seldom exceeding a foot thick, so their extraction involves the removal of extensive areas of top-soil. It so happens that the Upper Cam Valley, one of the main centres of coprolite digging in the old days, formed the chief area of Early Iron Age settlement in the county. There is ample reason for thinking that only a fraction of the material brought to light has survived, but for what has come down to us we are indebted wholly to the watchfulness of local residents. One of the most interesting discoveries was made on a low hill, known as Bellus Hill, Abington Pigotts, between 1879 and 1884, when the whole site was turned over to a depth of 12 to 18 feet in search of coprolites. From the notes very fortunately kept by the Rev. W. G. F. Pigott it is evident that the diggings destroyed

[1] 'By origin the word coprolite signifies petrified dung, presumably of enormous reptiles, but the term came to include phosphatised castes of vertebrate remains in general.'—*A Scientific Survey of the Cambridge District*, 126, London, 1938.

an open village covering in all some 20 acres. A study of the material salvaged at the time testifies to a series of settlements from the pre-Roman Early Iron Age to Anglo-Saxon and mediaeval times. Had it been possible to organize an emergency excavation on modern lines much more could doubtless have been learnt of the houses and of the development of the settlement, but without Mr. Pigott's observations the site would have been destroyed without leaving a trace. In some parts of the country the digging of chalk for marling has been a means of bringing antiquities to light, especially when, as sometimes happened, barrows were quarried for their material.

As a rule farm buildings seldom require deep enough foundations to bring very much to light, but many finds of importance have been made in obtaining material for their construction. Excavations for brick-earth have been especially fruitful in results, not least among which must be counted Frere's discovery at Hoxne mentioned in Chapter I. In the highland zone of Britain the search for stones to build field walls often led to the destruction of burial cairns with the consequent discovery of urns and grave-goods. As long ago as 1540 we find Leyland writing:

> Mr. Roulande Griffith tolde me that . . . in tyme of mynde menne usid not in Termone [i.e. Anglesey] to separate theyr grounde, but now stille more and more they digge stony hillokkes yn theyre groundes, and with the stones of them rudely congestid they devide theyre groundes after Devonshire fascion. In digging of these [they] digge up yn many places yerthen pottes with the mouthes turnid douneward, conteyning [*cineres et ossa mortuorum*].

Many of the lesser activities of country life have contributed in their own small ways to our stock of archaeological knowledge. Peat-cutting for winter-fuel has led to an enormous number of finds in the peat-bogs of Ireland, North Germany

and Scandinavia, dating from Mesolithic times onward. There is only space to cite a single find, that of a twisted torc of solid gold found in company with three bronze palstaves of Middle Bronze Age type, made by a poor man exercising his right of cutting peat in Grunty Fen in the Isle of Ely in the year 1844. According to a contemporary account he first of all came upon the three bronzes, and then, as he removed another foot of peat, the gold ornament sprang out of the soil. It was of pure gold and weighed 5 oz. 7·20 dwts. Evidently the turf-cutter happened to dig down on to the exact site of a votive offering deposited in the fen some 3,000 years ago. A large proportion of the Bronze Age gold objects, which make so glittering an array in the National Museum at Dublin, were found in similar fashion. To quote a further instance, the development of the egg trade played its part in the discovery of the Stone Age kitchen-middens of Denmark: pounded mollusc shells make an invaluable ingredient for hen food!

Another primary activity worth considering is fishing. When it is remembered that wide stretches of land in the Baltic and North Sea areas, as well as on the sea-board of Europe generally, have been covered by the sea only in comparatively recent times, the possibility of fishermen catching antiquities as well as fish is seen to be less remote than it might appear at first sight. Over many parts of the North Sea bed between the coasts of east Yorkshire and west Jutland, fishermen have found the remains of a great freshwater fen in the form of lumps of 'moor-log'. This fissile material, composed almost entirely of plant remains, occurs at depths ranging from 22 to 23 fathoms. Thousands of lumps must be thrown overboard by fishermen with no other feeling than dull annoyance, but one day in September 1931 something out of the ordinary occurred. Skipper Pilgrim Lockwood, Master of the steam trawler *Colinda*, was night fishing in mid-

channel between the Leman and Ower Banks off the coast of Norfolk, when his nets brought up a lump of 'moor-log' rather larger than he could easily manage. He broke it with his shovel and hit something hard; in his own words: 'I heard the shovel strike something. I thought it was steel. I bent down and took it below. It lay in the middle of the log which was about 4 feet square by 3 feet deep. I wiped it clean and saw an object quite black.' The moorlog had yielded up what proved to be the barbed prong of a fish-spear (Fig. 2) closely similar in type to specimens known to occur over the whole extent of the (Mesolithic) Maglemose culture province from eastern Britain to Esthonia. Pollen-

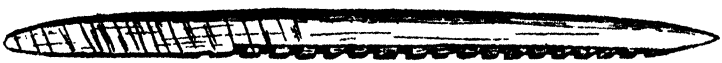


FIG. 2

Barbed bone fish-spear prong from the North Sea bed. Scale $\frac{5}{11}$

analyses of the 'moorlog' in the immediate neighbourhood of the find show it to be contemporary with some of the bog formations on the north European plain that have yielded relics of the same culture.

Really sumptuous discoveries have sometimes been made by fishermen and sponge-gatherers in the Mediterranean lucky enough to strike the site of ancient wrecks. Many a treasure ship laden with works of art *en route* from Greece to Rome foundered in these waters with all its cargo. Only too often the bulk of the statues, candelabra and the like, were mere workshop copies manufactured in bulk to satisfy the Roman craving for 'culture', but the fact that some of the former show clear traces of having been removed from pedestals suggests that a certain number of originals were also shipped to the Roman market. As a rule the marbles have been sadly

disfigured by sea-creatures, which have not infrequently nibbled and bored them to mere stumps, but apart from being coated with a calcareous deposit and encrusted with barnacles, all of which can quite easily be removed, the bronzes have survived a couple of thousand years beneath the sea without the slightest ill-effects.[1]

Rich as are the opportunities afforded by rural economy to the watchful observer there is no doubt that these have been enormously increased and intensified as a result of the Industrial Revolution. The growth of urban life, the increased demands of industry, and the immense development in communications have each in their own way tended to extend and deepen all manner of excavations and in so doing to bring antiquities to light in unprecedented numbers.

The most obvious result of urbanization is an intensification of building activity: not only do the areas trenched for foundations tend to spread, but at the centres increasing site values make for taller buildings and ever-deepening foundations. Moreover, the crowding together of great masses of people has led to the development of all kinds of public services. Water has to be accumulated in reservoirs and distributed by a network of pipes, sewage must be collected and disposed of, and gas and electricity generated and circulated, all of them activities which necessitate excavation, sometimes on a gigantic scale. On balance it may be that the progress of urbanization and building development generally is a menace to archaeology, since the clues it affords can rarely be followed up in a scientific manner; although, even where the compulsory contribution for the archaeological exploration of new factory sites obtaining in the U.S.S.R. is lacking, the voluntary organization of an emergency excavation can sometimes save the situation. In the case of built-up

[1] For details see *Antiquity*, 1930, 405 ff., and 1939, 80 ff.

areas, on the other hand, the piecemeal accumulation of evidence from all kinds of excavation work is the only practical way of building up anything like an intelligible picture.

It is in the nature of things that most of the archaeology brought to light in modern urban centres relates to previous phases of town life, in this country Roman and mediaeval, rather than to prehistoric remains. London is a case in point.[1] The foundations of our knowledge of Roman London were laid by a City chemist, Charles Roach Smith (1807–90), in his spare time. The collection of objects he obtained from city excavations is now housed in the British Museum, while his writings, all recording personal observations, form the permanent basis of research on Roman London. A close watch on all kinds of excavation by Smith and others has already revealed more than a score of the bastions of the Roman town-wall, three of them coming to light during the clearing of the Christ's Hospital site for the General Post Office (1908–9), one during the construction of the Inner Circle line near Tower Hill and another in the course of widening the old London and Blackwall Railway (1800). The plan of the basilica of Londinium, which has been described as the longest Roman building north of Rome, has been pieced together from excavations of different kinds in and about Leadenhall Market. The importance of Londinium as a port adds to the interest of what is almost certainly a Roman boat, found in the course of laying the foundations of the County Hall at Westminster (1910). Many of the smaller finds relating to Roman London have come from the old channel of the Walbrook, into which foundations of the Bank of England and neighbouring buildings have been built. Among other interesting relics of daily life the wet mud has

[1] See *Roman London: An Inventory of the Historical Monuments in London*, vol. III. London, 1927.

preserved masses of old shoes and cobblers' waste. The spread of 'modern civilization' to ancient provincial centres like Chichester has done much to stimulate the flow of discoveries in the field of Romano-British archaeology during recent years. The foundations of older buildings in such towns rarely penetrated much below the accumulation of mediaeval times, but the construction of chain stores and super-cinemas has often involved much deeper excavation.

Excavations connected with public services are more likely to yield results of prehistoric interest on the fringes of modern towns. The deep excavations required for gasometers have sometimes been fruitful. The 48-foot dug-out canoe, dating in all probability from the Bronze Age, found at Brigg, Lincs., in 1886 and the bone fish-spear prong of Maglemose type from Hornsea, Holderness, both came to light in this way. The construction of filter-beds is also worth watching.

The importance of sewage farms as places of archaeological discovery is probably due to their frequent location on gravel spreads, to which prehistoric man was especially partial. However this may be, there can be no doubt about the correlation. The recently excavated Mesolithic site at Farnham, Surrey, remarkable for its evidence of semi-subterranean houses and easily the most prolific site of its period yet excavated in the British Isles, was found on the local sewage farm, as was the neighbouring Early Iron Age site at Wisley, perhaps the most important in the county. Examples, which could be multiplied indefinitely, will probably occur to the reader.

Another aspect of the Industrial Revolution of value to archaeology has been the immense increase in quarrying of various materials. The removal of overburden should reveal archaeological evidence on a grand scale, but only a small fraction is usually salvaged. The development in recent years

of different forms of mechanical excavator has made it more difficult for watchers to observe antiquities when they are revealed, while the increased tempo that comes with machinery makes it less practicable to delay work for the examination of any features that may come to light. Nevertheless, the extension of quarrying during the nineteenth century tended to increase archaeological evidence in a remarkable way. The development of archaeology in the Kesteven division of Lincolnshire, for instance, is intimately bound up with the progress of iron-stone working, which has, indeed, brought to light the bulk of the Bronze Age pottery from the entire county, if the sandy warrens north of Scunthorpe be excepted. During the prosperity of the nineteenth century beakers and Late Bronze Age urn-fields must have been discovered in their scores to judge from the number that found their way into the museum of Grantham.

Chalk quarries, extensively worked for lime-making, are among the most productive. The clearing of overlying deposits often reveals the post-holes of structures, store-pits, silted-up ditches and the like, as well as loose antiquities. It sometimes happens that the chalk required for lime manufacture is covered by thick deposits of Pleistocene age. In this case excavation of the over-lying beds is liable to reveal Palaeolithic remains; indeed, two of the most famous Palaeolithic sites in Britain—Bolton & Laughlin's pit at Ipswich and the pits of the Associated Portland Cement Manufacturers at Swanscombe, North Kent, have been revealed through the quarrying of chalk.

Among the more specialized materials the digging of which has benefited archaeology, one may mention diatomite, a freshwater silt used for insulation purposes. Ever since diatomite has been extensively dug in the Bann Valley of North Ireland, quantities of flint implements, the leading form of which is a large tanged flake, have continually been coming

to light. Bann River flints rapidly found their way into collections and museums and were early recognized as a feature of Irish archaeology. Recently test excavations were made by an expedition from Harvard University, and hearths left during seasonal visits of small groups of fisher-folk were found at different levels in the diatomite. Side by side with the flints were found polished stone axes and round-based Neolithic pots, which served to indicate the cultural background of the fishermen.

Few developments of the last 100 years have been more conducive to archaeological discovery than the extension and multiplication of means of transport. Railway construction is known to have played a rôle of real importance in the development of geology, owing to the sections it revealed, but in western Europe the main period of railway building came too early to benefit archaeology to any substantial extent. One find of outstanding importance, however, may be mentioned—that of one of the largest and richest Anglo-Saxon cemeteries of the pagan period ever found in England, which came to light during the construction of Sleaford railway station. Underground railways, on the other hand, have been developing up to our own day, and consequently more advantage has been taken of opportunities afforded by their construction.

In London they have contributed substantially to our knowledge of the Roman city, although only too often the evidence they brought to light has been destroyed. During the construction of the Inner Circle Railway under Trinity Place in 1882 some 73 feet of the walls of Londinium were exposed and destroyed, and in 1935 excavations for a new sub-station in the same neighbourhood revealed a bastion. A careful watch was kept and in the lower courses of the bastion an inscribed stone was found, obviously incorporated from a monument of earlier date. The inscription proved to be part

of one, another portion of which had been recovered as long ago as 1852, belonging to the tomb of Julius Classicianus, who was sent to Britain in A.D. 61 as procurator after Boudicca's rebellion. A reproduction of the inscription has been set up in the station by the London Passenger Transport Board. A final railway anecdote shows that archaeological monuments sometimes hit back. It appears that on the outskirts of Rome in 1915 somebody noticed that ballast on the Naples line was disappearing down a hole and threatening the stability of the track: investigations revealed a basilica adorned in stucco-relief with scenes from Greek mythology executed in a style current during the first century A.D.

Roads lead to discoveries in two quite distinct ways, partly through new construction but mainly through the quarrying of material for maintenance. In Britain the former has all too little chance of operating, although bridge-building has produced many finds, an example being the hoard of thirty socketed axes dating from the Late Bronze Age, found in sinking caissons for the new bridge across the Trent at Keadby, Lincolnshire. What might be done in the event of a modern system of motor roads being built in this country is indicated by recent experience in Germany, where provision is made for the proper examination of sites met with during the construction of the *Reichsautobahnen*.

By far the most significant road metal, so far as archaeology is concerned, is gravel. Without gravel pits Lower Palaeolithic studies would be thrown back almost entirely on coastal exposures, and it is difficult to see how under such conditions they could have reached their present stage of development. The studies of Breuil and Kozłowski in the Somme Valley, which have formed a model for Palaeolithic-Pleistocene correlations the world over, were almost entirely dependent on the exploitation of gravels and sands for road work. Many a drama of excited discovery has been enacted also by amateur

collectors against the golden background of a gravel face! The story of the discovery of Piltdown Man (*Eoanthropus Dawsonii*) will serve as well as another. One day Mr. Charles Dawson was walking down a farm road at Fletching, Sussex, when he noticed that he was treading on brown flints quite unusual to the district. His curiosity was aroused and it was not long before he traced the gravel to its source in a small pit on Piltdown Common, where a thin seam overlay the Hastings Beds. As he left the pit he made his usual request to the workmen to keep any bones or other odd finds until his next visit. It was with pleasurable surprise that when he returned one of the men handed him a fragment of what appeared to be part of the parietal bone of a human skull. In 1911 he made a more impressive find himself by picking off a rain-washed heap of flints a substantial portion of the frontal region of a human skull. Convinced that the time had come to report his finds to higher authority he brought his treasures up to the British Museum (Natural History) and laid them before Dr. (now Sir) A. Smith Woodward, who was at once impressed with their importance. Arrangements were made to employ a man for sieving and in the spring of 1912 the greater part of the skull was brought to light. And so Dawson's observation on that walk of his, and his subsequent persistence, was rewarded by one of the half-dozen most debated skulls of early man ever found.

Gravel is only less important for what is to be discovered on its surface than for what it actually incorporates. Ever since its deposition it has been favoured for human settlement. Some of the chief Neolithic sites in England, among them the camp at Abingdon and the settlement at Fengate, Peterborough, have come to light in gravel-digging, not to speak of numbers of Beaker burials, Late Bronze Age urn-fields and Early Iron Age settlements.

Flint-digging on the South Downs has turned up a few

sites, while it was stone-quarrying on the slopes of Penmaenmawr in North Wales that brought to light the famous stone-axe factory at Craig Llwyd whose wares were traded as far as Wessex towards the end of Neolithic times.

Water transport has played an important part in archaeological discovery. The dredging of river-beds has recovered masses of archaeological material, much of it eroded from sites on their banks. Such finds have been made all over Europe for every period of prehistory since rivers have flowed in their existing beds. The Thames is a notable example, as a visit to the London Museum will show. Dredged finds suffer from lack of associations, although they sometimes group in a suggestive way; but individual pieces, especially those of bronze, are usually well preserved and among them are some of the outstanding examples of their kind.

The age of canal-cutting came too soon in England to benefit archaeology, but the excavation of the Kiel Canal revealed many sites and the deepening of its approaches off Ellerbek in the Kiel Fjord produced the type site for North Germany of the Ertebölle culture—at a depth down to 24 feet below sea-level! During the construction of the Baltic-White Sea Canal by the Bolsheviks the excavations were carefully watched and a number of investigations made by official archaeologists, in accordance with the accepted principle of watching the sites of new constructions for early remains.

The size of ocean-going liners has necessitated much excavation for docks and deepening of harbours. Dock excavations hold out promising possibilities of recovering material from many feet below sea-level, so allowing archaeological phases to be related accurately to their appropriate stage of geographical development. The discoveries at Barry

Docks and Southampton Docks of peat-beds well below sea-level underline this possibility, which has been—for lack of observation—too seldom realized. Well-known Mesolithic finds from harbour dredgings are those from the free harbour at Copenhagen, comprising bone and flint objects characteristic of the Maglemose food-gathering culture and dating from the time of the *Ancylus* Lake. Similar material has been recovered from dredgings elsewhere in Denmark, e.g. from the fjords of Horsens and Kolding on the east coast of Jutland.

War is another form of human activity which brings antiquites to light incidentally, though conditions for observation are seldom ideal ! The modern version, in which both sides dig themselves into the ground, is peculiarly favourable, since in disturbing the soil the rival combatants tend to reveal its historical content. It says something of the attraction of archaeology that in all the horrors of the 1914–18 War men found time to avail themselves of these opportunities. The different characters of the opposing peoples showed themselves in the way they responded. On the German side orders were given from above. When discoveries were made in the field they were automatically reported to General Headquarters, who saw to it that museum authorities behind the lines were informed and given every facility for investigation. In this way, particularly on the eastern front, many useful finds were made and exploited. One of the best known was the cemetery dating from the first to the sixth centuries A.D. brought to light during the erection of defences near Lötzen, East Prussia, in which Hindenburg took a great personal interest. Professor Kossinna has recorded the following remark of the Marshal made on one of his visits to the excavations, ' In the presence of the high-standing German culture of antiquity it behoves us to keep quite clear in our own minds that we can only remain German, if we know how to keep our sword sharp

and our youth fit to bear arms'.[1] Even archaeology can be used to rally national forces for war, given the right atmosphere.

On the English side initiative rested with individuals, but official apathy no more stifled the private bent for archaeology in war than it does in peace time. Many an English family treasures archaeological relics recovered from military works in the Gallipoli peninsula and even the trenches of northern France yielded their spoil. The German offensive of 1918 caused the erection of a net-work of trenches behind the British lines at Coigneux, near Arras. The trenches were cut through a loess deposit into a clay bed at the junction of which Levallois implements occurred quite commonly. It so happened that the officer in charge of the 42nd Division Observers posted in the neighbourhood was a certain Captain Francis Buckley, later to make a reputation for himself as the chief investigator of the Mesolithic sites of the Pennines and already interested in flint implements. By searching the parapets of the newly excavated trenches Buckley managed to collect a good series of the palaeoliths and to establish satisfactorily their true stratigraphical position. In the scientific paper recording his wartime discoveries he rather wistfully remarked that 'had it been possible to excavate the parapets at suitable places, no doubt much greater finds of implements would have been made. But for military reasons this was quite out of the question.' As it happened the Germans were thrown back and these particular trenches were never manned. The palaeoliths were sacrificed in vain.

Another feature of the 1914–18 War—the use made of aircraft—was destined to affect the future development of archaeological research profoundly. The application of aerial photography to archaeology can be traced directly to the experiences

[1] G. Kossinna, *Ursprung und Verbreitung der Germanen in vor- und frühgeschichtlicher Zeit*, 302. Berlin, 1926.

of war-time observers, among them the German pioneer, Dr. Theodor Wiegand, who succeeded in tracing the eastern extremity of the Roman *limes* in the Dobrudja from the air. When peace came Col. Beazeley was among the first to realize the archaeological value of a method since greatly furthered by another wartime flier, Mr. (Major) O. G. S. Crawford. It may be noted also that the earliest experiments were made with British Army balloons. As long ago as 1880–7 Major Esdale's scheme for photographing ancient sites in the neighbourhood of Agra was being perfected. It was actually approved by the India Office, but official difficulties intervened and the scheme was never carried out. The first air-photographs of an archaeological site ever published were those of Stonehenge taken in 1906 by Lieut. P. H. Sharpe from an army balloon. Since the 1914–18 War innumerable discoveries have been made in the ordinary routine of R.A.F. training, and thanks to the liaison maintained through the Ordnance Survey these are made available to the public.

Peace has also brought leisure to search the scars of war in the shape of old trenches and other military works. Salisbury Plain has been productive of more than one find of this kind. A famous instance is that of the Mesolithic site at Piscop in the forest of Montmorency, a few miles north of Paris, where the hollowed-out floors of a group of huts were found, probably representing the winter camp of a small group of food-gatherers 5,000 years or more ago. The first indications of the site were given by an examination of an old artillery trench twelve years after the Armistice. The well-known Mesolithic site at Kelling, Norfolk, was found by searching the scars left by wartime trenches.

The trench-digging during the September crisis of 1938 must have turned up many antiquities, although anxiety and haste combined to minimize the harvest. One instance that

happened to come under observation occurred in the grounds of Epsom College. A shelter trench revealed a grave (4′ 8″ × 3′ 8″ × 3′ 6″ deep) walled with closely packed blocks of untrimmed flint. Unfortunately the bones were badly disturbed before the grave came to notice, but sufficient remained to indicate a man of approximately 5 feet 4 inches in height. No grave goods were found, but the associated snail-shells were typical of the Early Bronze Age.

It would be easy to think of other ways in which natural processes and the works of man conspire to expose antiquities to those who care to observe them, and easier still, though doubly tedious, to quote further examples. A more convincing way of reinforcing my point is to consider how certain groups of antiquities have in fact been discovered. So far as Lower Palaeolithic discoveries in Europe are concerned natural exposures and excavations of an economic character—mostly quarries—account for all but an insignificant proportion. To illustrate the causes operating for finds of later periods I cannot do better than tabulate the circumstances attending finds from different periods from definite regions, details of which I happen to have by me:

Finds relating to the Maglemose (Mesolithic) culture in Britain:

Coastal erosion	1
Caught in fisherman's trawl	1
Sewage-farm works	1
Laying out recreation ground	1
Old war trenches	1
Gasometer excavation	1
Gravel-digging	2
River-dredging	2
Unknown (old collection)	1
Total	11

Gold bowls of periods III and IV of the Nordic Bronze Age: [1]

Coastal erosion	1
Ploughing	3
Under large stones (removed in course of agriculture)	3
Peat-cutting	1
Road-building	1
Sand-digging	2
Railway construction	1
House foundations	2
Unknown	3
Archaeological excavations	3
Total	20

SURFACE INDICATIONS

Other sites betray themselves by their surface relief. Sometimes they break the surface so notably as to challenge excavation. It is an understandable, though none the less melancholy fact, that early excavators availed themselves only too fully of the invitation so openly extended. There is, however, some compensation in the knowledge that there is no necessary relation between the physical prominence of sites and their sociological significance.

In countries where plenty of loose stone is available—in the 'highland zone' of Britain for instance—the dry-stone walling of frontier defences, hill-forts, tombs and domestic buildings tends to survive in recognizable form, though it must be remembered that such constructions made tempting quarries for the people who followed after. Megalithic tombs and free-standing monuments like Avebury and Stonehenge are other features, which, when they survive, are generally conspicuous. In the 'lowland zone' (roughly

[1] Up till 1913 when Kossinna published his 'Der Goldfund von Messingwerk bei Eberswalde', *Mannus Bibl.*, no. 12.

south and east of a line drawn from Hull to Bristol) 'earthworks' are commonly the most prominent features—barrows heaped over the dead, linear earth-works like Wansdyke or the Belgic dykes of Hertfordshire, and hill-forts girt by banks and ditches, sometimes of giant proportions. Caves are a feature of limestone countries that invite a search for Upper Palaeolithic man, while in parts of the Near East and of the Danube Valley the earliest centres of settled life are advertised by giant mounds or tells composed of the debris of successive settlements on the same site.

Other features, notably the lynchets of ancient field-systems, are less visible on the surface by reason of their low relief and were generally missed by the earlier archaeologists. Observation of these low banks in recent years, however, has told us much of ancient systems of cultivation, especially on the chalk downs of southern England and on the heaths of North Holland and of Jutland. In some areas careful observation has revealed farmsteads, by the excavation of which related field-systems have been dated. Recently Professor Hatt, working chiefly on heather-covered heaths in the province of Himmerland, Jutland, has brought to light a complete agricultural system with fields defined by low banks and nucleations of farmsteads, dating from the Early Iron Age of Denmark.

In detecting and mapping such slight surface inequalities as ancient field-systems generally afford, every advantage has to be taken of natural conditions. The sun is most important. With the shadows long in early morning or evening sites of low relief are to be seen to their best advantage. In districts where the field divisions are marked by stone walls a fall of snow is often very effective in showing up the pattern. Snow was also found of value by the Danish archaeologist Therkel Mathiassen in tracking down old Eskimo house-ruins in the North Hudson's Bay region. Under certain

circumstances flooding by water helps to define superficial inequalities of archaeological interest. The exceptional floods in the East Anglian Fens during 1937 afforded several illustrations of this, but even the normal seasonal flooding of restricted parts of the fens can be relied upon to give results. Major G. W. G. Allen's magnificent photograph taken in June, 1937, and reproduced on pl. I shows a portion of the Washes, a gigantic sump between the Old and the New Bedford Rivers designed to contain flood waters overflowing the lower inner banks of the two drains. Meandering across the Washes and defined by the winter flood-waters can be seen the broad levée of an ancient river. On either bank of this watercourse during its final stage, marked by the narrow meander visible within the broad band of the levée, lived Romano-British peasants, who cultivated during the first four centuries of the Christian era the rich silt deposited by the river in its previous history. The ditches of their small rectangular 'Celtic' fields are in certain instances clearly defined by the flood-water.

Many relief sites defined by shadows are likewise best observed from the height allowed by an aeroplane; from such a vantage point low banks and ditches, which on the ground fail to attract attention because at that low angle they appear meaningless, achieve coherency and are seen to conform to some recognizable plan. Some of the best mapping of ancient field-systems has been done by means of air-photography, and it is worth noting that a photograph of such taken at 4 p.m. on May 8th, 1922, from Old Sarum (Salisbury) aerodrome at a height of 10,000 feet was one of the first to draw attention to the archaeological possibilities of air-photography. Air-photographs of 'shadow-sites' have also told us much about the ancient 'camps' that crown so many of the eminences of the chalk downs of southern England. The great bank and ditch dating from

the Early Iron Age on Trundle Hill, from which an excellent view can be had of Goodwood racecourse, was well known to archaeologists, but until the site was photographed from the air in 1925 no one suspected the existence of a very much earlier camp, consisting of two rings of banks and causewayed ditches with an intermediate string of pit-dwellings; subsequent excavations by Dr. E. C. Curwen proved that the earlier camp was of Neolithic age. Such is the prominence of the Early Iron Age hill-forts that the resources of air-photography might seem in their case superfluous, but observation of the minor relief revealed by shadow-photographs has sometimes given information of great value. For instance it was an air-photograph of the unfinished hill-fort on Ladle Hill, Hants. (pl. II), that gave us the key to stages of construction in such works. Traces of a slight marking-out trench can still be seen on the causeways temporarily left between the deeper sections of the ditch proper to allow the passage of men and material, while well within the line of the rampart the tips of surface soil from the ditch-cuttings, thrown back so that the core of the rampart could be built of chalk blocks from lower levels of the ditch, are clearly visible. Shadow-photographs sometimes help in elucidating minor internal features of hill-forts as well as phases in their construction, and they often assist an excavator to determine the most profitable situation for his key sections.

Where the traces revealed from the air are difficult to find on the ground it is sometimes possible to map ancient ditches by thumping the ground with a heavy rammer (preferably a navvy's implement fitted with a long handle) and listening for indications of hollowness. A chalk sub-soil with a thin capping of mould is best adapted to the percussion method; to quote its discoverer, Dr. E. C. Curwen, 'over undisturbed chalk or a bank of consolidated chalk rubble the note produced is high-pitched and dull; over mould or loose material

filling a pit or ditch it is low-pitched and resonant. The two types of note may be compared respectively to the sounds "thud" and "thoomp"'. Even stamping the ground with the foot will often give some indication of ancient disturbance. A windless day should be chosen for percussion if it is to be done alone, but with a companion stationed in a near-by hollow out of the wind equally good results can be obtained even on a windy day, owing to the readiness with which the vibrations are conveyed by chalk. Using this method Dr. Curwen has been able to plan the discontinuous ditches of Neolithic camps, invisible on the surface. It is also useful for locating store-pits in the interior of hill-forts. The accuracy of the method has frequently been tested and vindicated by excavation.

Where the surface is ploughed ancient sites are often revealed by soil-marks. When pasturage covering an area of Romano-British settlement in the fens of northern Cambridgeshire is broken up for the first time in recent history, the peat-filled ditches of the ancient fields and droveways show up clearly against the background of the pale coloured silt. A few years of cultivation tend to obscure the clarity of the picture to the observer on the ground, but the pattern continues to be recognizable from the air for a very long time. In chalk regions subjected to heavy ploughing soil-marks, especially when seen from the air, preserve the sites of ancient monuments, which have lost all or nearly all their surface relief, in a most amazing way. In following up Major Allen's photographs on the ground Mr. O. G. S. Crawford was recently able to treble the number of round barrows known in the Royston district of northern Hertfordshire and south-western Cambridgeshire; many of the barrows were revealed as soil-marks, a whitish halo indicating the chalk rubble round a turf core with a dark outer band to mark the ditch.

But bare soil is as a rule less eloquent of ancient remains than is its vegetable covering. A careful watch on plant life will often bring its reward to the archaeologist. As any one who has noticed dense growths of nettles by disused middens or cattle sheds will appreciate, the addition of organic substances to the soil, such as might result from human settlement, is liable to find some reflection in the surrounding vegetation. There are, however, reasons for doubting whether vegetation can ever reflect human settlement of great antiquity through any such direct chemical cause. Thus Therkel Mathiassen working at Disko Bay, half-way up the western coast of Greenland, found that the ruins of the most recent Eskimo settlement were marked by vigorous growths of sappy-green *Alopecurus* vegetation; the older ruins, on the other hand, were difficult to distinguish from the surrounding landscape with its covering of willow bush, dwarf birch, crowberry and bilberry. In the Julianehaab district of southern Greenland the same worker was even able to recognize at a glance the relative antiquity of the house-ruins: those with very luxuriant grass vegetation proved to belong to the nineteenth to twentieth centuries, those with much vegetation to the seventeenth to eighteenth centuries and those with little or no vegetation to the earliest stage of the Eskimo settlement in the region.

The clues afforded by vegetation are generally more indirect: in a very dry country disturbed ground will often carry more moisture, and so affect the local plant ecology. Miss G. Caton-Thompson succeeded in discovering and mapping the Ptolemaic irrigation channels of the Fayûm (Egypt) by observing the localized growth of desert plants mainly of the genus *Mysembrianthemum*. In Britain and western Europe generally vegetation also gives its clue to ancient disturbance as a result of differences in the moisture available for growth: where building foundations or the footings of ploughed-

down ramparts are in the way crops will tend to languish, resulting in pale crop-marks; where on the other hand ancient trenches, store-pits, graves or post-holes exist, the topsoil will tend to be deeper and the crops will grow with extra luxuriance and so cause darker markings. Such crop-marks are generally visible but seldom intelligible from the ground: like shadow-sites and soil-marks they are best observed from the air. Good results have been obtained from observing ordinary wild pasturage, but most discoveries have been made with such agricultural crops as wheat, peas, beans, roots and clover. Chalk is a favourable soil, but silt and gravel are equally good. Much depends on the weather and on the state of the crops. A dry summer is peculiarly favourable to crop-marks in that it tends to accentuate contrasts. On the other hand, too dry a summer is often fatal to grass sites. The 'henge' monument at Arminghall, Norwich, showed at the time of its discovery by Wing-Commander Insall, V.C., in the summer of 1929, two concentric ditches broken by an entrance giving access to a central area on which could be seen quite distinctly the socket-holes of great timber uprights arranged to form a horseshoe pattern open towards the entrance (pl. III). In the spring of 1935 the ditches were quite distinct even on the ground and slight traces could be seen of the post-holes; but by the summer the post-hole markings had vanished and by the end of the excavations in early autumn the ditches themselves had faded appreciably.[1] Markings may also vary on the same site according to the nature of the crop and according to its stage of growth. When dealing with a complex site with numerous tiny markings, therefore, it is very desirable if possible to obtain a series of air-photographs taken under varying crop and weather conditions.

[1] For an account of the excavations at Arminghall and a general survey of the 'henge' problem, see *Proc. Prehist. Soc.*, 1936, 1 ff.

Discoveries made in England during the past fifteen years through the observation of crop-marks from the air have been numerous and in some cases of outstanding importance. Ancient field-systems, barrows, camps and enclosures of all kinds ploughed flat in modern times have been rescued from oblivion in large numbers, particularly on chalk and on gravel spreads. Among the most significant discoveries the so-called 'henge' monuments have a special claim to closer attention. The observation of the original Woodhenge at Durrington, Wilts., was made from a height of 2,000 feet by the same flyer who discovered the Arminghall site. The low circular bank had long been known locally from observation on the ground, but previous to Wing-Commander Insall's photograph the existence of an arrangement of six rings of post-holes within the enclosed space had not been suspected. Mrs. Cunnington's excavations, which followed the discovery from the air, disclosed the former existence of a monument of the same general type as Stonehenge, only made of wood. Since that time a whole group of analogous monuments has been recognized, including that at Arminghall already described. In addition to helping in the first discovery of sites, crop-marks are often capable of aiding the excavator in laying out his trenches. For instance the task of excavating the group of barrows close to Woodhenge was made very much easier by the fact that the actual graves, indicated by small dark spots in the middle of the circles, were distinctly visible on the photograph. In the case of extensive sites like Roman Caistor-next-Norwich, where the plans of buildings show up clearly as pale markings, crop-marks often save the excavator much dead work.

Animals can also play their part. Their positive activities as burrowing agents are too well known to require comment, but their failure to burrow in suitable ground may

give an equally useful clue. One day in 1932 up on Easton Down, a few miles east of Salisbury, where for some years past he had been searching for early sites and excavating them, Dr. J. F. S. Stone noticed an elongated patch of virgin turf untouched by moles or rabbits. His suspicions aroused, he removed the turf and found a layer of tightly packed flint nodules, sufficient to explain why they had neglected the area. On pulling up the flints he came upon a number of small cists cut into the underlying chalk, some containing urns with cremated remains, others just plain cremations. What he had found turned out to be a small urn-field dating probably from the latter part of the Middle Bronze Age (1400–1000 B.C.). As it happens, the cemetery, though a small one, proved to be of special interest owing to the beads of lignite, amber and faience found with the cremations; recent work on trade routes during the Early Bronze Age makes it likely that the amber reached Wessex from the West Baltic region by way of routes already well established, while it has lately been proved that the faience beads came from Egypt, where the same synthetic and highly complex material was used for precisely similar beads in the fourteenth century B.C.

BOOKS, MAPS AND OTHER CLUES

It might at first blush seem a contradiction in terms to aver that reading books could ever lead to discoveries in prehistoric archaeology, but that it is true the story of Schliemann alone should suffice to prove. That we now know the city of Troy, which Schliemann took for Homer's Ilium, to have been something like a thousand years older, does not alter the reality of discoveries which, but for Homer, might never have been made. And Schliemann *did* find Homer's Troy, though experts now consider it to have coincided with the beginning of the seventh (VII*a*) rather than with

the second of the site's phases. At Mycenae he was equally mistaken in his identifications, but the magnitude of his discovery is none the less for the fact that till his dying day he never realized he had made it. Had he not been inspired by Pausanias to dig for the tombs of Atreus, Agamemnon and the rest, he would never have brought to light the splendours of Mycenaean civilization which changed all previous ideas as to the development of culture on the mainland of Greece.

But archaeological discovery has been influenced even more directly through the written record of archaeological exploration itself. In Europe and parts of the Near East, where archaeological research has had a history running into many generations, the works of pioneers, particularly those who like Aubrey and Stukeley were devoted to topography, have proved most suggestive, affording many invaluable, if sometimes unwitting, clues to modern field-workers.

Again, the maxim that discovery breeds discovery was never truer than when applied to archaeology. The publication of results almost invariably leads to fresh discoveries in the field. Demonstration of the authenticity of cave art in France and North Spain during the nineteenth century induced a veritable boom in Palaeolithic art, of which the effects spread far beyond the confines of western Europe to North and South Africa. The sudden revelation of moor and lake villages in Switzerland following the drought of 1853–4 led to the search for similar structures—and consequently to their discovery—all over Europe. Glastonbury is but one example. Arthur Bulleid had read Keller's book (see p. 64 note) when he came as a young doctor to take up a practice near the Somerset marshes. Consciously on the look-out for a likely site he early fastened his attention on a group of low mounds in the Gedney marshes. His suspicions were given substance when, examining mole-hills on the site, he found bones and

charcoal. Making inquiries among men employed in cutting drains in the marsh he soon tracked down a dug-out canoe in the vicinity of the site. From this it was but a step to excavation, and he spent many seasons with his colleague, H. St. George Gray, revealing the marsh village of his imagination.

Your true archaeologist is generally a lover of maps. Maps are not only an essential form of record for finds already made ; intelligently used they narrow down the field and sometimes even give the clue to new discoveries. Contour maps have their uses in a fresh countryside, but geological maps may be even more valuable. No one in his senses would prospect a new area for caves without verifying the distribution of limestone formations, or neglect sand in pursuit of microliths : conversely, it is generally a waste of time to look for prehistoric sites in heavy clay country.

There are even ways in which maps may give direct clues to early sites while the archaeologist is comfortably ensconced in his arm-chair. We owe it to General Roy that, ever since the first edition over 120 years ago, the one-inch sheets of the Ordnance Survey of Britain have had marked on them the positions of such antiquities as were observed during the Survey. It thus happens not infrequently that early editions of the Survey give exact clues to the whereabouts of barrows and other monuments, all surface indications of which have been ploughed away in the last hundred years. Larger scale maps (e.g. the six-inch O.S.) marking field and parish boundaries, sometimes betray the presence of antiquities unwittingly. The apparently irrational behaviour of a field boundary may give the clue to an archaeological site, whose presence caused deviations to be made at the time of the enclosures : most of the new group of Long Barrows on the Lincolnshire Wolds were 'discovered' in this way during the revision of six-inch sheets at Southampton. Conversely

the unduly rational behaviour of an English lane has more than once betrayed a stretch of Roman road.

. Place-names, particularly those in local use, are well worth watching. In the simple background of rural life burial mounds, camps and dykes were almost bound to attract attention and acquire names—generic terms to express their outward form and, more rarely, specific names having reference to their supposed contents or associations. The generic terms vary widely from place to place. Even within the confines of Britain we find many equivalents for such a simple term as the English 'barrow': in the stony highland zone 'cairn' ('carn', 'carnedd', &c.) is most usual; 'how', 'howe', 'haw' and other variations of the old Norse '*haugr*' (= mound or cairn) are common in Yorkshire, Cumberland, Westmorland and Scotland; in Derby, Cheshire and Staffordshire you meet with 'low' (Saxon '*hlaew*' = earthen mound), in Gloucestershire with 'tump' and in East Anglia with 'hill'; elsewhere you may find 'cop', knoll', 'butt' (New Forest), 'mount', 'toot' (Somerset) and a string of others, all applied to ancient burial mounds and not unseldom to natural hillocks as well.[1]

Some of the commonest specific names attaching to barrows preserve memories of discoveries of bones when mounds were dug into for marl or other agricultural needs, e.g. such names as Deadman's Grave or Hills of the Slain, attached to long barrows in Lincolnshire. Names like Money Hill, Lucky Hill, &c., probably also hark back to finds made in barrows casually, or in course of treasure-seeking. The fact that some of the treasure-legends attaching to barrows have been confirmed by the results of archaeological excavation has led some enthusiasts for folk-lore into thinking that they carry back to the time of the original burials. It seems much

[1] For further reading see L. V. Grinsell, *The Ancient Burial-mounds of England*. London, 1936.

more likely that they embody local memories of mediaeval treasure-seeking such as we know to have been carried on under royal licence. One of the legends often quoted was connected with a tumulus in Lexden Park, near Colchester, according to which an ancient king lay buried there wearing gold armour, with golden weapons at his side and accompanied by a golden table. When the barrow was opened in 1924 the excavators found in very fact the burial of a Belgic individual of high rank and among the grave goods was chain mail, a bronze table and gold tissue, possibly the remains of cloth of gold. It is significant that there were ample signs of previous disturbance having affected a good third of the burial area. Still, however we interpret them, local place-names and local tradition cannot be ignored as clues to discovery.

One further example of the value of place-names and local lore must suffice. Kostenki, on the Don, was so famous for its finds of mammoth bones that it not only acquired its name thereby (Kostenki = bone village), but became the centre of many popular tales. By some the bones were attributed to the giant 'Inder' who lived underground, but whose bones came to the surface on his death. Others said that a giant was once passing through the village with his offspring. Finding the Don too deep to wade, he drank it dry. When he turned to call his young, his body failed to stand the strain and burst, his bones flying in all directions to the places where they are found to-day. The learned preferred to attribute the bones to elephants of Alexander's army, even as their British colleagues invoked Claudius and those of France and Italy, Hannibal. Reports of these stories ultimately found their way to the Czar and in 1768 Catherine II sent Gmelin to investigate. Ever since, Kostenki has been known as a potential site for investigation. With the revival and intensification of prehistoric archaeology after the revolu-

ion the place has become one of the leading palaeolithic tations in South Russia.

There is no aspect of contemporary life which a keen archeologist can afford to ignore. It is above all important to ecome fully acquainted with the behaviour and prejudices f the society in which one works. The most unlikely clue vill sometimes lead to an epoch-making discovery. The Chinese dragon bones are a case in point. They gave the lue to two of the three or four most important archaeological liscoveries made in China in modern times—Peking man nd the oracle-bones of An-yang.[1]

If the average Englishman ever gives a thought to dragons t is probably to connect them with St. George. In China he dragon is a very actual being. In the days when an mperor yet occupied the dragon throne and the imperial lragon standard still floated over his palaces, the dragon trode the land as guardian of its ruler, while to-day, as ever, ie receives the offerings and prayers of countless millions s purveyor of rain in time of drought. The bones and eeth of so powerful a creature have not unnaturally been ighly esteemed for their healing powers and from the earliest imes have formed one of the chief medicines stocked by Chinese apothecaries. Early writers have much to say as to he mode of their selection and preparation. Lei Hiao (A.D. 420–77) was of the opinion that 'Dragons' bones from Yen Chou, Tsang Chou and Tai Yen are the best. . . . Those showing five colours are best; the white and the yellow are medium quality and the black ones are worst. As a rule it may be said that those in which the veins ire longitudinal are impure, and those collected by women ire useless.' His directions for preparing the medicine

[1] For further details consult J. G. Andersson, *Children of the Yellow Earth*, Chap. V, London, 1934, and H. G. Creel, *The Birth of China*, London, 1936.

are reminiscent of Mrs. Beeton in her most ruthless mood :

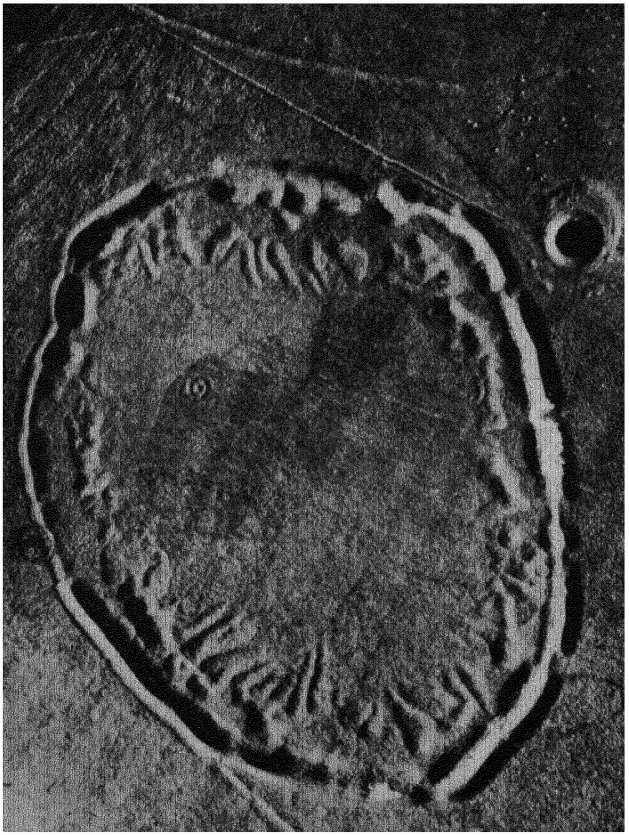
> To use dragon's bone first boil some aromatic herbs. Wash the bone twice in the hot water, then reduce it to powder and place it in bags of thin stuff. Take two young swallows and, after removing their entrails, stuff the bags into the swallows and hang them over a spring. After one night take the bags out of the swallows, remove the powder and mix it with a preparation for strengthening the kidneys. The effect of such a medicine is as if it were divine.

Dragon's bones can still be bought in Chinese drug-stores, the modern prescription being to pulverize and take with tea.

In 1899 a German naturalist bought numerous samples of dragon's bones from apothecaries' shops in various Treaty Ports and took them home for investigation. Professor Max Schlosser, a well-known palaeontologist of Munich, examined the material closely and found it to consist of fossil mammalian bones, among which he distinguished no less than ninety species. His monograph, *Die fossilen Saügethiere Chinas*, was for many years the standard work on the Tertiary and Pleistocene mammals of China. It was partly under the influence of Schlosser's book that towards the end of the Great War the Chinese Geological Survey determined to trace some of these dragons' bones to their source. In the course of this search the Swedish scientist, J. Gunnar Andersson, at that time acting as Mining Adviser to the Chinese Government, discovered in 1921 the extensive bone-deposits in the cave of Chou K'ou Tien. Five years later further work on the 'dragon-bone' deposits produced the first human tooth. Subsequent years saw the discovery under the direction of Davidson Black and Pei of the whole group of fossil hominids with an associated bone and stone industry, which has since become world-famous.

AIR-PHOTOGRAPH OF WELNEY WASHES, NORFOLK [*Photo. Major G. W. G. Allen*

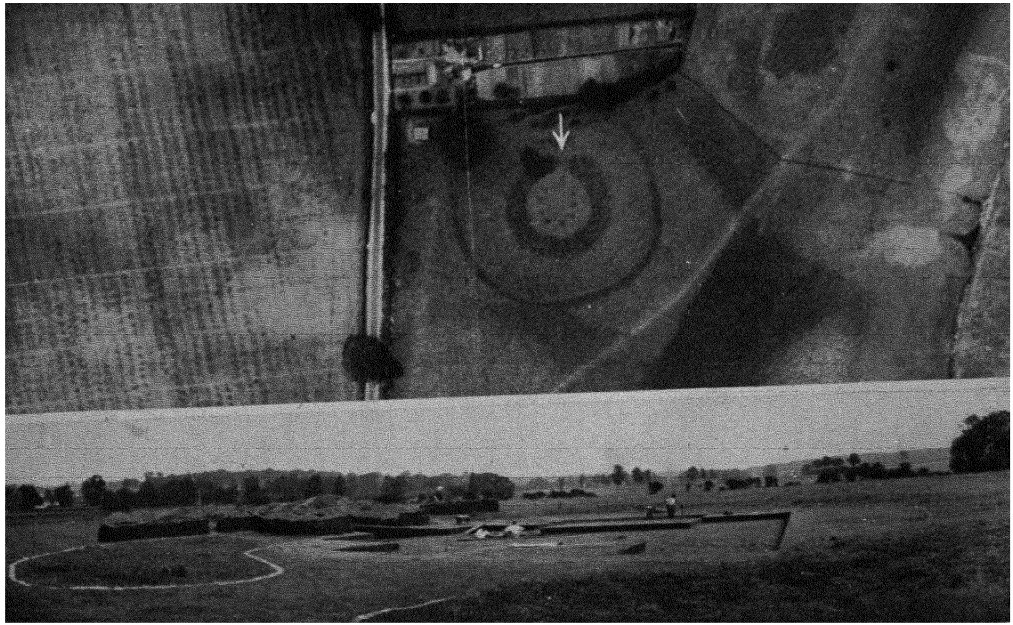
(TEXT, P. 36)



AIR-PHOTOGRAPH OF LADLE HILL, HAMPSHIRE
(TEXT, P. 37)

(*a*)

(*b*)



[*R.A.F. photo. reproduced by permission. Crown copyright reserved*

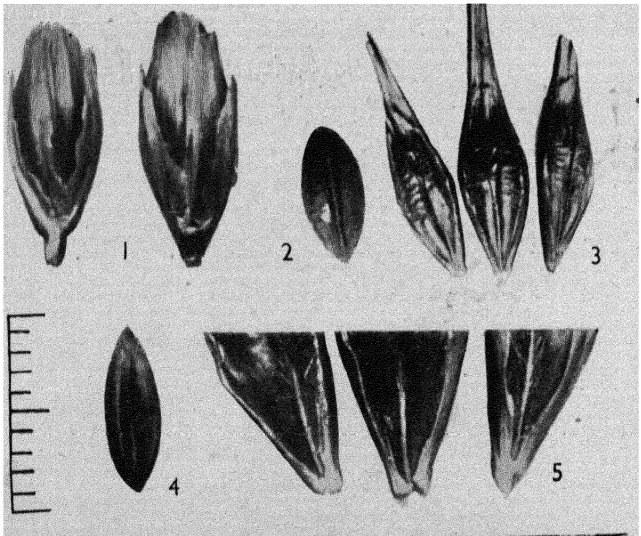
(*a*) AIR-PHOTOGRAPH OF THE "HENGE" MONUMENT AT ARMINGHALL, NORFOLK

(*b*) PHOTOGRAPH OF THE SAME SITE FROM THE GROUND

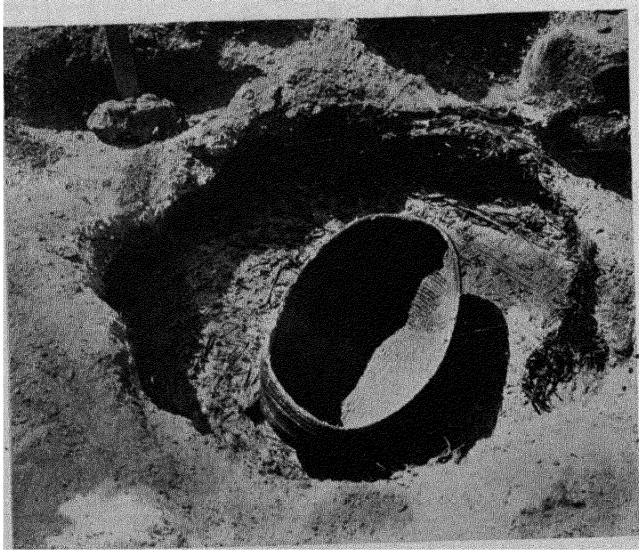
(TEXT, P. 40)

IV

(*a*)



(*b*)

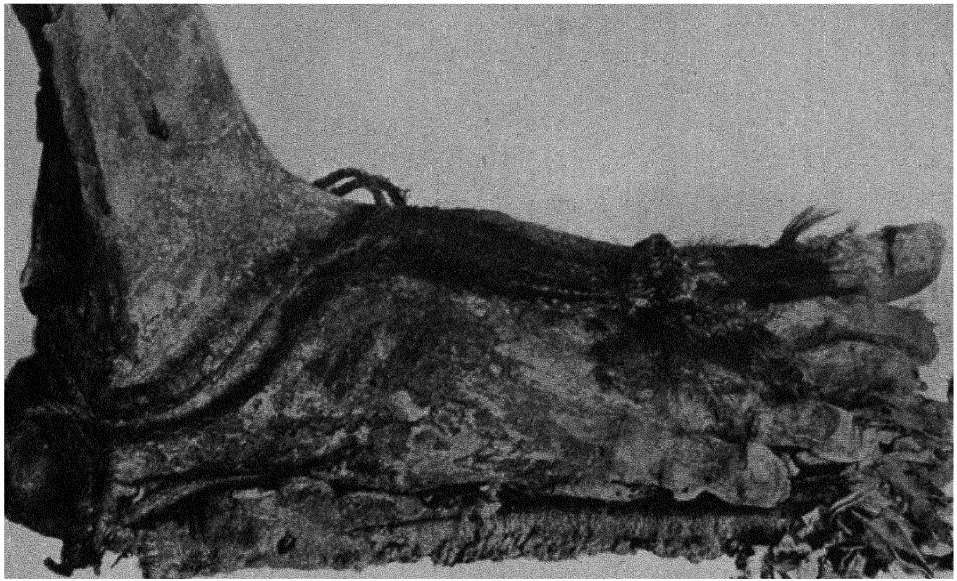


[*After Caton-Thompson*

(*a*) WHEAT AND BARLEY FROM THE FAYÛM, EGYPT
(*b*) BASKET AND SILO IN POSITION

[*After Stein*

REMAINS OF A WOODEN HOUSE AT NIYA, KHOTAN
(TEXT, P. 58)



[*After Kidder*

HUMAN FOOT WITH SANDAL FROM A BASKET-MAKER CAVE AT KAYENTA, ARIZONA

(TEXT, P. 62)

[*After Broholm and Hald*

MAN'S KIRTLE AND CLOAK FROM AN EARLY BRONZE AGE OAK COFFIN BURIAL AT BORUM, DENMARK

(TEXT, P. 70)

[*After Schwantes*

EARLY BRONZE AGE WOMAN IN OAK COFFIN FROM SKRYDSTRUP, SCHLESWIG-HOLSTEIN

(TEXT, P. 71)

The oracle-bones came to light in the following way. It appears that whenever a certain patch of ground in An-yang, North Honan, was ploughed, bones were brought to the surface. A certain farmer called Li formed the profitable notion that these were undoubtedly dragon's bones. The apothecaries to whom he used to sell them noticed that some of the bones were marked with un-dragonlike characters, but thinking little about it merely scraped them clean to make them saleable. In 1899, however, some marked specimens got into the hands of Chinese scholars. Decipherment showed them to constitute the earliest written records of China, dating from the time of the Shang dynasty (1765–1123 B.C.). This discovery quickly had the effect that, instead of inscribed bones being scraped clean, plain ones began to be supplied with fake inscriptions in such numbers that doubt began to attach to the whole group. The genuineness of the original finds has since been fully confirmed by the scientific excavations at An-yang begun in 1928. The inscriptions on the bones record questions asked of gods and ancestral spirits between three and four thousand years ago. To obtain an answer the diviner used to apply heat and study the behaviour of the cracks so formed. The inscriptions give us an unique insight into the hopes and fears of Chinese people in a period for which there is no other written history.

CHAPTER III

PRESERVATION

WHAT an archaeologist finds when he sets spade to earth depends to some extent upon the methods he uses and the powers of personal observation he brings to bear ; but the possibilities of any site are limited fundamentally by what has survived the passage of time. And so in this chapter I am going to examine the main factors which regulate the preservation of early remains. The subject is one of supreme importance for two reasons : it largely determines the proper methods to be followed in the actual work of excavation, and it affects profoundly that ultimate task of the archaeologist—the interpretation of his finds.

VARYING SURVIVAL-VALUE OF DIFFERENT MATERIALS

Inorganic materials. It is sufficiently obvious—although the consequences are not always fully appreciated—that, other things being equal, objects will tend to survive according to the material from which they are made. By and large, organic materials are more likely to decay than inorganic, although even these are by no means immune. Stone masonry in general survives well, but the marks of surface tooling, even engraving or relief carving, may easily be destroyed or gravely impaired by exposure to weathering or the attacks of an acid soil : thus, until the bases of the stone monoliths at Avebury were examined by excavation and clear traces of dressing revealed, it had always been supposed that they were erected

in a rude and untouched state. Kiln-fired bricks are among the most enduring remains, but those fired in the sun, such as are usual in parts of the Near East, may disintegrate rapidly under adverse conditions. Flint and stone implements are the most imperishable of antiquities, and for that reason bulk unduly large as 'type fossils' of early cultures, but even these, although they seldom disappear completely, often undergo serious surface changes: exposure will facilitate the onset of patination, soil movements connected with glaciation will score them with striae, while carriage in water, in a river or on the sea-shore, will sometimes roll them so effectively as to reduce them to unrecognizable pebbles.

Metals vary greatly in their powers of resistance. Gold is well-nigh imperishable, as we are reminded by the recovery in faultless condition of countless treasures found under the most diverse conditions in many parts of the world. Silver, on the other hand, although, when not too debased, it retains its form moderately well, usually tarnishes badly. Of the more useful metals lead and bronze survive much more satisfactorily than iron, which is rapidly reduced to rust. Bronze and copper objects from bogs and river-beds are sometimes as good as new, but so often do they come down to us with a bright green patina that we are sometimes in danger of forgetting that in their bright, burnished sheen lay their principal attraction to early man. Adverse conditions will sometimes disintegrate the surface of a bronze so badly as to remove all trace of decoration, and where sufficiently severe they may even reduce bronze objects, especially thin blades, to mere greenish stains. Iron objects are more frequently reduced to discolorations of the soil, although sometimes where the core has disappeared its form will be preserved in a kind of rust-impregnated matrix.

Although its fragility ensures that pottery only survives complete under exceptional circumstances, individual sherds

are extremely long-lived when adequately fired. Prehistoric pottery fired in an open kiln, however, tends to lose its surface rather easily, especially when a thin outer slip has been applied, and abrasion of the edges of sherds often makes the rebuilding of pots a difficult matter. Badly fired pottery is sometimes found in a softer state than its enclosing matrix, in which case it can be removed only after treatment. Really acid soils may even devour prehistoric pottery without leaving so much as a trace.

Organic materials. Organic substances, although as a group they decay more easily than inorganic, nevertheless show many gradations. Of animal products antler, bone, and ivory are by far the most resistant, although hair is capable of enduring under conditions and over a length of time that would surprise some people. Ligaments and skin (natural or prepared as leather) are neither of them very enduring, although capable of long outlasting flesh and the soft parts of the body. Animal fat can survive in residual form over very long periods, although rarely in more closely identifiable form.

Vegetable remains as a class have very low powers of resistance, although even here there are gradations. Wood, bark, nuts and seeds tend to outlast leaves, flowers and delicate stems : cereals, for instance, are more likely to be represented by bare grains than by grains replete with their tell-tale ears and husks. It hardly needs stressing that such remains survive as a general rule only when carbonized or as impressions on burnt clay.

CLIMATE AS A FACTOR IN PRESERVATION

One of the most important factors to be considered is climate, which varies in its effect from destroying every trace of organic material to conserving it as freshly as though just removed from a refrigerator.

Very warm, moist climates. Possibly the most deleterious climate from the archaeologist's standpoint is that of the equatorial and tropical rain-belts, where hot moist conditions and insect pests combine to destroy rapidly all trace of organic substances, and rank vegetation overgrows and even dislodges the strongest masonry. Maudslay and Joyce and other explorers of the Maya civilization had to hack the massive temples of Honduras and Yucatan free of their entangling growths. On every side they found signs of collapse, due in part to the pressure of vegetation, in part to the decay of supporting timbers. Thomas Gann, writing of ruins in British Honduras, describes how 'the roots of large forest trees, finding their way into the interstices between the stones, have, in the course of the ages, left hardly a single piece of the original masonry *in situ*'.[1] Excavations have habitually disclosed a bewildering variety of burnt clay and stone objects, including masks, crystal skulls, and flints worked to the most fantastic shapes; but not a trace of the woodwork in which the art of the stone-carvers was cradled, no wooden utensils or basketry, and none of the extravagant wearing apparel depicted on the stelae were found. The same is true of regions in South Asia potentially of great archaeological wealth, viz. South India, Indo-China, Malaya, Java, and the islands: only the hardest residue of material culture remains—all else has been ruthlessly purged away by the warm rains.

Very dry climates. Within the sub-tropical desert belt of the northern hemisphere are zones of scanty rainfall where conditions exist for the preservation of perishable substances to a degree unknown anywhere else, save in the realms of perpetual refrigeration on the margins of the habitable earth.

[1] *Discoveries and Adventures in Central America*, 120. London, 1928. Other useful references include the *British Museum Guide to the Maudslay Collection of Maya Sculptures from Central America* (1923) and T. A. Joyce's *Maya and Mexican Art*. London, 1927.

The classic zone of desiccation is, of course, Egypt, with parts of Inner Asia, and the south-west parts of the U.S.A. and the coast of Peru as good secondary examples.

(i) Egypt. Papyri are in some ways the most astonishing of all the remarkable things that have come out of Egypt. As the Egyptians, Greeks, and Romans wrote their books on fragile papyrus, made from the pith of a Nilotic water-plant, we would have been compelled, but for the conserving sands of Egypt, to rely for our knowledge of their literature almost entirely on vellum documents dating from later times.

The first discovery of papyri of which any record survives was made in the Fayûm in 1778, when natives found a bundle of them in a pot. Most of them were burnt as rubbish, but one passed into the hands of Cardinal Borgia and was published ten years later. From this time onwards a steady stream of papyri found their way to Europe, but it was not until 1891 that public interest was really aroused, when a remarkable group was edited by Mr. (now Sir) Frederick Kenyon of the British Museum. This single collection included the lost treatise on the constitutional history of Athens by Aristotle, the ' mimes ' of the little-known poet Herodas, part of a previously unknown oration of Hyperides, and early versions of writings from Homer, Demosthenes and Isocrates. About the same time a number of papyri, dating from the third century B.C. and including fragments of Homer and Plato, and of a lost tragedy of Euripides, were recovered from the cartonnage of a mummy excavated by Flinders Petrie. These and the subsequent discoveries, which came in ever-increasing numbers, have added 600 years to our knowledge of Greek writing, restored to us lost portions of many of the greatest Greek authors and versions of known works earlier by some centuries than any previously found, given us manuscripts of the Bible earlier than any yet known, and, not least, have

told us all we know of the literature of ancient Egypt. All this we owe to the dry soil and climate of Egypt: elsewhere in the ancient world papyrus documents have rarely survived.

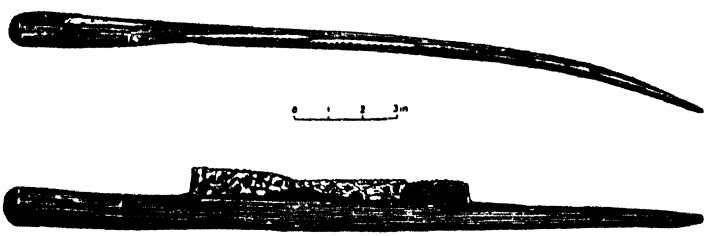
The tombs of the Pharaohs furnish another eloquent testimony to the virtues of a dry climate. The treasures of Tut-ankh-Amen's (*c.* 1354 B.C.) tomb at Luxor,[1] the furnishings and trappings, the textiles and flowered garlands, that took ten years and £44,000 to deal with—are familiar enough, but it is not always realized that judged by Egyptian standards physical conditions were by no means ideal. Quite apart from the deleterious effects of the unguent, the excavators complained of damp, which at different periods in the past found its way in through fissures in the limestone. The damp appears to have reduced leather-work to a black viscid mass, to have dissolved adhesive glues, causing objects to fall apart, and to have resulted in a certain amount of warping in some of the wooden objects. That such a complaint should be made only serves to show how normal in a country like Egypt is a perfect state of preservation among objects three and four thousand years old and often made of highly perishable substances. Any archaeologist digging in England would give his head to find grave-furniture in anything approaching such a state of preservation as that in the young Pharaoh's tomb.

The survival of the Pharaohs themselves in their golden coffins is admittedly due in the first place to the practice of mummification, but, as more than one writer has pointed out, the mummies themselves could not have endured save in air as dry as that of Egypt. The conserving powers of climate in respect of human bodies are well displayed in the burials of Predynastic times, which were placed without embalming or

[1] Howard Carter and A. C. Mace, *The Tomb of Tut-ankh-Amen*. London, 1923.

the protection of any form of coffin directly in a shallow grave scooped in the warm desert sand. The rapid desiccation that ensued, aided by the draining properties of the sand, may well, as Eliot Smith insisted, have suggested the practice of mummification to the people of Dynastic times.

Less spectacular, but of deeper significance in human history, are what many believe to be the oldest granaries in the world, discovered by Miss G. Caton-Thompson in the open desert



[*After Caton-Thompson*

FIG. 3

Wooden sickle handle with flint teeth inset, from an ancient silo in the Fayûm, Egypt (see pl. IV)

of the Fayûm.[1] There were two distinct granaries, each comprising some scores of small silos (from 15 to 62 inches in diameter) of coiled basketry, one on the higher, the other on the lower slopes of the beach of a lake of Palaeolithic days. Although close to the surface—the rims of the silos were only a few inches below the desert floor—the higher of the two was wonderfully intact. Clearing them, their discoverer found a delicately made basket, a wooden sickle handle with the flint teeth still held in position with mastic (Fig. 3), and grains of wheat and barley (pl. IV). What is chiefly remarkable is that this, the oldest cultivated grain

[1] *The Desert Fayûm.* London, 1934.

in the world yet found, is so perfectly preserved, albeit in carbonized form. Describing barley from one of the silos an expert has stated that it was ' in a practically perfect state of preservation. Even the hairs on the rachis and rachilla and the tiny " prickles " on the nerves were clearly to be seen and, except for . . . having a curious mahogany tinge and being very light and brittle, it might have been harvested yesterday '.

(ii) Inner Asia. The ancient kingdom of Khotan is cut off from moisture-bearing winds by the great arc of the Himalaya, Pamir and Tien Shan mountains. Human settlements in such a region are restricted to oases which, when abandoned through some political mishap or in response to some more fundamental natural cause, are rapidly engulfed in desert sands. The Taklamakan Desert has been a good friend to archaeology.

Although remote and inaccessible by modern standards, Khotan was once traversed by devout pilgrims from China, who from the fourth century onwards passed through on their way to the Buddhist shrines of India. Some of the descriptions written by returned pilgrims have survived, and their study has helped to convince Western scholars that Khotan lay on the route by which Buddhist teaching and worship spread from India to China and the Far East. The first tangible evidence from the soil of Khotan came to light in 1890 in the form of inscribed birch-bark leaves brought back from Kucha by Capt. Bower. The survival of documents written on such perishable material implied conditions of preservation of quite exceptional character. One of the first to realize the possibilities was Aurel Stein, who within ten years was to lead an expedition of discovery with the backing of the Government of India.[1]

The richest finds of the 1900–1 expedition were made in

[1] Aurel Stein, *Ancient Khotan*. Oxford, 1907. Also, *Sand-buried Ruins of Khotan*. London, 1903.

the eastern part of the country on the fringe of the Taklamakan Desert some sixty miles due north of Niya. Here, following up the clues of native ' prospectors ', Aurel Stein came upon the ruins of an ancient settlement abandoned some time towards the end of the third century A.D. Around the houses, which wind erosion had often exposed as terrace-like features (pl. V), he found the gaunt and desiccated remains of gardens, drives with their rush fences, avenues and arbours of poplar trees and orchards of peach, plum, apricot and mulberry (Fig. 4). The houses themselves were built on massive timber foundations into which were set square wooden posts to carry the roof and provide a framework for the walls. These were made of a kind of matting of diagonally woven tamarisk branches covered on either side with white plaster and in rare instances embellished with frescoes. When the settlement was abandoned by its original inhabitants they carried away the best of their movable possessions, but left behind an assortment of discarded odds and ends, not to mention several promising rubbish-heaps. Most important of all, they abandoned quantities of official memoranda and other documents inscribed on wooden tablets and leather.

As he cleared room after room of sand Stein recovered just the kinds of things an incoming caretaker might find in an abandoned house handed over to her care by outgoing tenants. In one room, evidently an office, he found wooden tablets, inscribed and blank, tamarisk pens, wooden eating-sticks, and a large hammock of tamarisk rushes. In another, a small closet, he came across a tamarisk bow, a bundle of wooden spear-shafts, part of a wooden shield, wooden spindles and a wooden walking-stick in such fine condition that he was able to make good use of it. In other rooms his loot included a broken guitar, still retaining some broken strings, a wooden chair elaborately carved, a number of brooms, a wooden mouse-trap and a wooden shoe-last. Felt, cotton textiles and

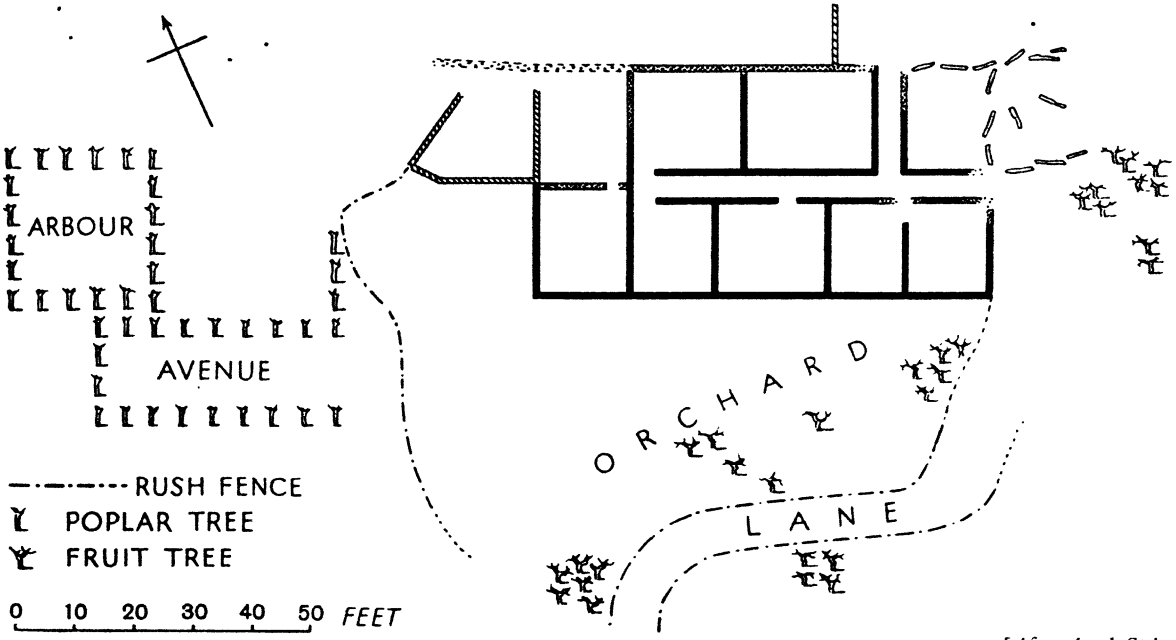


FIG. 4

Plan of ancient house at Niya, Khotan, with layout of orchard and grounds (cf. pl. V)

patterned rugs were found in somewhat tattered condition, but retaining their colours remarkably. It is, indeed, difficult to believe that the pale blues and greens and the dull Chinese reds were delighting the people of Niya more than a century before the Roman legions left the shores of Britain.

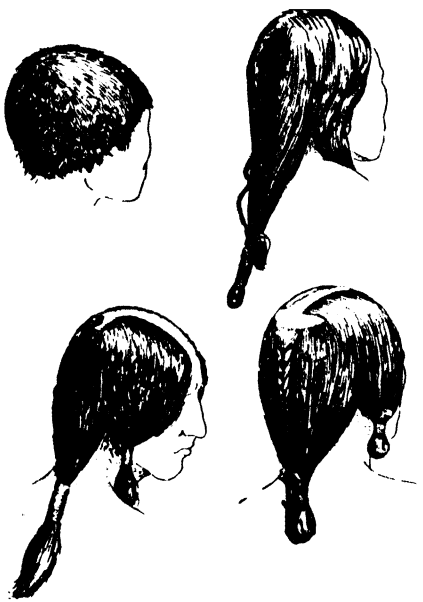
Though his fingers were numbed by a bitter north-east wind and his nostrils assailed by a smell which had retained its pungency through the centuries, the explorer, like a true archaeologist, delved patiently through all the rubbish-heaps he could find. Among the potsherds, straw, pieces of broken lacquer-work, and rags of felt, woven fabrics and silk, he was rewarded in finding a series of documents inscribed on carefully prepared sheep-skin in the same script as the wooden tablets, and folded into neat little rolls.

All the documents dug up at Niya were written in Kharosthi, the script of North-West India during the first centuries A.D., so testifying to the importance of Indian influence in a territory politically subject to China. Stein's investigations indeed furnished the first tangible evidence of the spread of Buddhism from India to China, probably the most remarkable of India's contributions to the general development of mankind. The seal impressions on the wooden tablets reflect also contacts between China and the West, some of them being purely Chinese in character, others representing Athene, Eros, Heracles, &c., and plainly derived from classical sources.

Sir Aurel Stein's discoveries in Chinese Turkestan rank as one of the epics of archaeology. It is a chastening thought that in a temperate climate not one of the documents, none of the textiles and little of the wooden structures and their furnishings would have survived more than a few years. Yet in the desert sands of Khotan they endured for seventeen centuries, for all the world as though they had been abandoned yesterday.

(iii) America. The preservative powers of desiccation are

well illustrated in North America by the so-called Basket-Maker culture of the south-western states.[1] Although its



[*By courtesy of the Peabody Museum of Harvard University*

FIG. 5

Hair-dressing styles of the Basket-Maker people of Arizona (cf. pl. VI)

absolute age has recently been drastically reduced [2] the culture is recognized to belong to an early spread, substantially antedating in origin the Pueblo cultures of the same and

[1] S. J. Guernsey and A. V. Kidder, 'Basket-maker caves of north-eastern Arizona', *Papers of Peabody Mus. Am. Arch. and Ethn. Harvard Univ.*, VIII, no. 2 (1921); also *Bull. Bur. Am. Arch.*, no. 65 (1919).

[2] Until recently the last millennium or millennium and a half B.C. was regarded as reasonable. Dendrochronology favours a period from the middle of the fourth to the end of the ninth century A.D.

neighbouring districts. Yet in the shelter of dry caves and overhanging rocks, to which the Basket-Maker people repaired for occasional refuge for the storage of their crops and the disposal of their dead, many organic remains have survived.

The bodies of the dead are found as well preserved as those of the Pre-dynastic people in the sands of Egypt, and like them they owe their survival entirely to natural desiccation. It has even been possible to make a close study of the often intricate styles of hair-dressing (Fig. 5). The Basket-Makers probably needed but little clothing because of the high temperature, but women's aprons and cord sandals of several varieties have survived intact. To show how well objects are preserved in the caves of this region I illustrate (pl. VI) a human foot with its sandal still in position. Coiled basketry in the form of trays, bowls, carriers, water containers (with the inner surface pitched with gum) and trinket boxes, often beautifully decorated, form the bulk of the grave goods. Feathered ornaments, decorated textiles, netting, rabbit snares, leather bags and pouches, and wooden spear-throwers, feathered darts with stone heads in position, clubs and planting sticks are among the other objects normally found. In one cave in the Kayenta region of north-east Arizona a large dog was excavated; its body was dried up, but its long white hair was quite intact. Even the bodies of the flies which hatched out after the burial of the poor beast were found in a good state of preservation. The excavators hoped to deduce therefrom the exact season of the burial, but *Caliphora Coloradensis* is one of those hardy flies which flourish from spring to autumn.

South America can show very remarkable examples within the territories of the Incan Empire. It is known from the descriptions of Spanish writers from the first century after the Discovery that Incas of note were arrayed in splendour, yet the most careful excavations in the neighbourhood of their

headquarters at Cuzco have failed to disclose more than a few bare fragments of textiles. Only in the arid coastal tract of central and southern Peru have conditions been favourable for the preservation of textiles, and here in such cemeteries as Ancon, Pachacamac, Ica, Nasca and Arica splendid finds of Inca and Pre-Inca Age have been made.[1] So well preserved are some of the mummies that patterns of conventionalized birds and fishes tattooed on legs and forearms can plainly be discerned. Ambitious basket-work headgear in the form of tapered cylinders, the tops decorated with feathered mosaics, the lower and broader ends wrapped round with patterned textiles, also testify to highly favourable conditions. But above all it is the textiles that make ancient Peru famous. The greatest care seems to have been lavished on the tunics of the notables, which were spangled with gold and silver, embroidered, decorated with feather mosaic and coloured by the tie-dyeing method, their varied hues surviving almost as fresh as when they were worn centuries before the New World had been rediscovered.

Temperate conditions. The properties of a temperate climate which make it pleasant for Europeans are generally inimical to the lengthy survival of perishable materials. Relatively warm but variable temperatures and a sufficiency of precipitation combine as a rule to accelerate decay and dissolution. The one redeeming feature of such a climate from an archaeologist's point of view is its ability to maintain lakes, bogs, and fens, and under propitious circumstances, to generate waterlogged conditions in the interior of barrows.

(i) Lake Villages. The lakes of the Alpine region, embracing Switzerland, the French Jura, Württemberg and the northern frontiers of Italy, have given us more tangible evidence of the perishable aspects of the material culture of Neolithic man than all the 'dry land' sites of Europe put

[1] Gösta Montell, *Dress and Ornaments in Ancient Peru*. Göteborg, 1929.

together.[1] The wooden houses were built on frames, sometimes laid directly on marsh bordering a lake, sometimes on piles driven into the lake-bed a certain distance from the shore. Where pile-villages have been built so far out as still to be under the lake waters only the piles remain, but where by the sinking of the lake level the houses have become incorporated in growing peat deposits, as also happens to the ordinary marsh villages, their floors and even the lower courses of their walls will sometimes survive intact. At Riedschachen, a site on the southern shores of the Neolithic Federsee in Württemberg,[2] both types of houses were found superimposed, in the lower level two large dwellings (*c.* 45 feet long) built on piles driven into the bed of the lake, and in the upper a group of eleven smaller houses erected on a framework of sleeper beams. All the houses were rectangular in plan and were sub-divided into two rooms, the pile-dwellings being differentiated by their greater size and the extensive development of their fore-porches. The clay hearths and baking-ovens were of course preserved in perfect condition (pl. XIII).

The survival of organic materials, particularly those from the ancient lake-beds, has told us much of the habits of Neolithic man for which evidence is either lacking, or at least scarce in other parts of Europe. So far as animal remains are concerned the Alpine area is admittedly not particularly outstanding, since the calcareous lake deposits being alkaline no traces have survived of leather or wool, both of which have been preserved in the northern bogs. Nevertheless, the bones of cattle, pigs, sheep, goats and dogs testify to the domestication of animals, while the presence of red deer, fallow deer, roe deer, elk, brown bear, wild pig, aurochs, fox, hare, chamois,

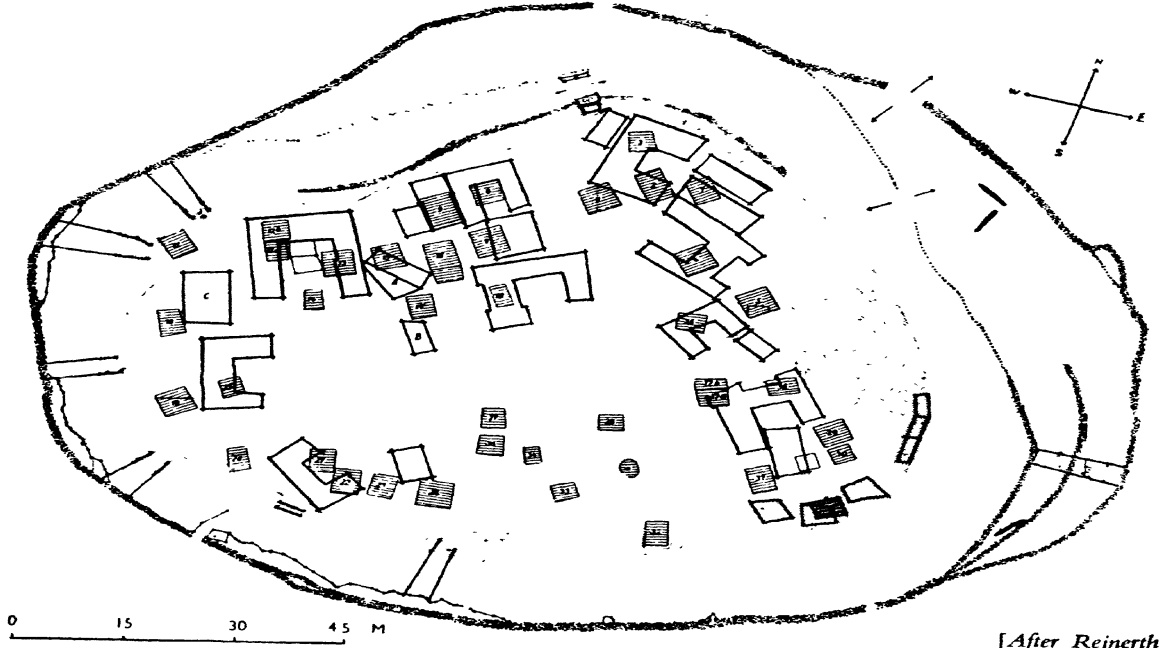
[1] Ferdinand Keller, *The Lake Dwellings of Switzerland and other parts of Europe*. London, 1866.

[2] H. Reinerth, *Das Federseemoor als Siedlungsland des Vorzeitmenschen*. Augsburg, 1929.

ıedgehog, stork, swan, wild duck, heron, pike, salmon and :arp, show that hunting and fishing were also practised.

For vegetable remains, on the other hand, the Alpine sites ıre pre-eminent. Among the wooden objects which have urvived must be reckoned clubs, hammers, handles of all :inds, shuttles and other weaving appliances, ladles and scoops, lishes, bows and fish-net floats. Basketry, net-work, mat-vork and linen textiles have come down to us in fragmentary :ondition, it is true, but still sufficiently well preserved to :eveal an astonishing variety in techniques of plaiting and veaving. It is particularly unfortunate that none of the linen :ragments are sufficiently large to tell us anything definite of :he style of dress affected by Neolithic man in this part of the vorld. None of the textiles retain artificial colouring, ılthough the presence of remains of weld suggests that yellow was a favourite colour. In comparison with the meagreness of the evidence from other parts of Neolithic Europe tangible remains of vegetable food are pleasantly ıbundant. Barley, wheat, oats, rye, millet and peas, together with such common weeds of the cornfield as darnel, goosefoot, burdock, campion, chickweed, spurry, creeping crowfoot and others, confirm the existence of agriculture, for which querns and sickles (their teeth still set in wooden handles) would otherwise have been the only evidence,—evidence, it should be added, by no means conclusive. That the lake-dwellers collected wild fruits is known from the occurrence of remains of plums, sloes, bird cherries, apples, pears, raspberry, black-berry and strawberry, as well as of beech- and hazel-nuts. Caraway seeds may well have been used as condiments, and poppy seeds been pressed for oil or eaten scattered on bread. Mosses were evidently used to plug cracks and holes in the wooden houses, and timber fungi were collected for use as fire-lighters.

A somewhat different form of settlement, built on a small

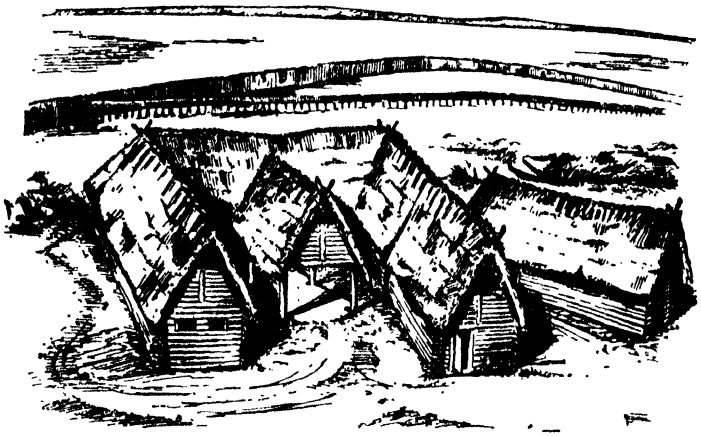


[*After Reinerth*

FIG. 6

Plan of Wasserburg Buchau, a defended island settlement (Late Bronze Age) in the ancient Federsee, Württemberg

island some distance from the lake-shore, came into use in parts of the Alpine area during the Late Bronze Age. A good specimen, Wasserburg Buchau, built on what was once an island in the Federsee, has been completely uncovered and,



[*After Reinerth*

FIG. 7

Farmstead at Wasserburg Buchau (second phase), restored from surviving timbers

thanks to water-logging, its timber features were admirably preserved (Fig. 6). It is worth pausing a moment to see what the excavators found when they dug away the peat. In the matter-of-fact language of archaeology they found indications of two successive occupations, one dating from *c.* 1100 B.C. and represented by thirty-eight small rectangular houses, the other from *c.* 900 B.C. and comprising nine farmsteads, each enclosing three sides of a yard (Fig. 7). The edges of the island were protected by a stone facing reinforced on the north side by timber stakes. An outer palisade, consisting of some 15,000 pine stakes stuck in the lake mud and probably

projecting several feet above the water, served at the same time as a breakwater and an outer defence. Traces of defensive platforms were met with at several points on the inner edge of the palisade and each was connected by a small bridge with the island. Where the outer palisade was most distant from the island there was an inner palisade consisting of a single line of posts. Within the sheltered harbourage at the eastern end were found three dug-out canoes, which with the numerous paddle-rudders found at different points conjure up a vivid picture of traffic to and from the island to the mainland on the lake shores.

The crannogs of Britain differ from Wasserburg Buchau in that to some extent they have been built up by artificial means. The lake-village at Glastonbury in the Somerset marshes,[1] famous as having, with its close neighbour, Meare, contributed most of what we know of the more perishable aspects of the material culture of the pre-Roman Iron Age in England, consists of sixty to seventy huts contained within a roughly rectangular area and surrounded by a palisade of closely set wooden stakes, designed to retain the foundations of the settlement and to provide protection. Each hut was placed upon a timber and brushwood foundation anchored by stakes to the underlying peat. A clay floor was laid over the timber foundation with a hearth at the centre. The wall posts of the hut were set round the clay floor and driven into the substructure, the thatched roof being supported by a central post near the hearth. Compression and decay of the substructure of each hut caused local subsidences to develop, which meant the laying down of a new clay floor and the rebuilding of the hut. This went on until as many as ten floors accumulated on the site of one hut, giving rise to the low mounds which led to the discovery of the site. The clay hearths, being at the centre of the huts, sank more rapidly

[1] A. Bulleid and H. St. G. Gray, *The Glastonbury Lake Village.*

and had to be renewed at more frequent intervals ; as many as thirteen were found superimposed in one hut.

In particular the woodwork from these Lake Villages invites admiration for its wonderfully accurate turnery and joinery. The cups and tubs, both stave-made and cut from the solid, the loom-frames, ladles, handles, and above all the masterly wheel-hubs and spokes, all serve to underline what has been lost on the ordinary ' dry land ' site. As in the Neolithic and Bronze Age villages of the Alpine zone of Europe, evidence for the sources of food is exceptionally rich. It is safe to say that the Lake Villages at Glastonbury and Meare, thanks to their being permanently waterlogged, give us more insight into the daily lives of people living during the latter stages of the pre-Roman Iron Age than any other sites yet excavated in England.

(ii) Oak coffin burials. The oak coffin burials under round barrows, dating from the Early Bronze Age in northern Europe and mostly found in the area from northern Schleswig to central Jutland, constitute some of the most remarkable instances of survival in the temperate zone.[1] Their preservation is due primarily to the water-logging of the barrows, the inner cores of which were formed of stones packed round the wooden coffin.[2] Excavators have found on reaching the heart of such a barrow that water has gushed out. It has recently been noted also that concreted bands (*ortstein*) occur near the outer surface of the mounds. These, especially where they have been duplicated by the enlargement of the barrow (as in the well-known one at Skrydstrup, Hadersleben, excavated in 1935), had the effect of insulating its core from the evaporating effect of winds, and may well have helped to maintain it in water-logged condition.

[1] For a summary and references see H. Shetelig and Falk, *Scandinavian Archaeology*. Oxford, 1937.

[2] A similar stone packing helped to preserve the Oseberg Viking Ship (pl. XIX).

The stagnation of the water in such barrows set up acid conditions peculiarly favourable to the survival of certain organic substances. The coffins themselves, consisting of half a hollowed-out oak trunk enclosed in an outer shell of two halves fitted together, survived intact in many instances. It was noted that some had holes at the bottom to allow the escape of moisture set up by putrefaction. The bodies, whose skin, hair and ligaments were comparatively well preserved, were laid in their coffins fully dressed and accompanied by ornaments and other personal possessions. Among these latter must be included many highly perishable remains,—wooden sword scabbards and palstave handles, a horn dagger handle and combs of the same material, birch bark pails, cups and bowls of carved wood, a folding stool covered with otter's skin and strongly recalling in its form the type used in ancient Egypt, and, above all, a series of woollen textiles which give remarkably complete evidence for the dress of Nordic people over 3,000 years ago.

Although essentially a sheep's wool fabric, the material incorporates a certain proportion of red deer hair. The reason for this admixture may in part have been aesthetic, the hair giving an appearance of added depth and texture, but the desire to render the material more impervious to rain may have been more important. The men seem to have worn kirtles reaching to the knee, with leather shoulder-straps and woollen belts; over these were thrown long cloaks (pl. VII). There is no evidence for the use of trousers such as were worn by the horse-riding Scythians. The men's caps were round affairs with a shaggy exterior made up of innumerable loose threads knotted at the end. Shoes were made of leather or cloth. The women wore close-fitting jackets with sleeves reaching to the elbow. Their skirts were sometimes heavy, reaching down to the ankles and gathered in at the waist by a tasselled belt; but sometimes they were light, being made

entirely of woollen fringes extending little below the knee. The Skrydstrup woman (pl. VIII) wore a pad under her blonde hair, a wig, and a hair-net of horse-hair. (Fig. 8).

(iii) Stray bog finds. Wherever peat-bogs are present these should be closely watched, because they are capable of adding greatly to our knowledge of early cultures by preserving features which have normally long since disappeared.

[*After Schlabow*

FIG. 8

Method of wearing hair-net current during the Early Bronze Age in Denmark and Schleswig-Holstein (cf. pl. VIII)

Finds from peat-bogs in northern Europe range from human bodies with hair and skin intact—the north German '*moor-leichen*' (pl. XIV, upper)—to fish-nets, boats, ploughs, skis, sledge-runners, and all manner of handles, sheaths, scabbards and receptacles.

Very cold climates. The most perfect climatic conditions for preservation are to be found in the circumpolar regions of the northern hemisphere from northernmost Russia and Siberia to Alaska, northern Canada, the sub-arctic archipelago

and the coasts of Greenland. In the permanently frozen soil of parts of this vast tract remains of early man and of some of the animals he hunted are preserved as though in a giant refrigerator, the process of decay held permanently in check.

(i) Mammoths. The frozen mammoths of north-eastern Siberia, more than twenty of which have been recorded, are effective illustrations of what an intensely cold climate can accomplish in the way of conservation.[1] Most of the discoveries have been made in the New Siberian Islands, or comparatively close to the Arctic Sea. The circumstances under which they were found suggest that they fell through surface layers of snow into deep crevasses, bringing snow down upon themselves in their struggles, so putting themselves neatly into cold storage. A few rhinos have been found in similar conditions, but none of the other quarries of Upper Palaeolithic huntsmen seems to have been heavy enough to meet a like fate—and it remains to find early man himself frozen and intact.

The best preserved—or at least the most expeditiously investigated—of the Siberian mammoths was found at Beresovka by a Lamut tribesman, who chopped off a protruding tusk. The story he told of a great hairy devil, when he came in to Sredne-Kolymsk to sell the ivory, so stimulated the interest of those in authority, that in the following year (1901) an expedition was sent out by the Imperial Academy of Sciences under the leadership of Dr. Otto F. Hertz accompanied by the zoologist E. V. Pfizenmeyer. The mammoth was found in a silted-up crevasse in a cliff overhanging the river Beresovka. The pelvis and right fore-leg were fractured as a result of his fall, which the presence of half-masticated food on his tongue and in his teeth shows to have been as sudden as it was unexpected. The position of the forelegs,

[1] Bassett Digby, *The Mammoth and Mammoth-hunting in North-East Siberia*, London, 1926.

well displayed in the mounted specimens (pl. IX), shows that he died while still trying to extricate himself. When originally discovered the trunk—a succulent morsel—was already missing,[1] and in the course of the summer immediately preceding the arrival of the expedition, wolves had devoured the fleshy covering of the top of the head. The rest of the body was remarkably preserved. The epidermis, it is true, had rotted, but the hair, although loose, was perfectly intact. When the skin was lifted in the process of dismemberment, Herz tells us that 'The flesh from under the shoulder, fibrous and marbled with fat, was dark red and looked as fresh as well-frozen beef or horse-meat. It looked so appetizing that we wondered for some time whether we would not taste it. But no one would venture to take it into his mouth, and horseflesh was given the preference.' The dogs apparently ate ravenously whatever was thrown to them. It was even possible to identify remains of the creature's last meal, traces of which were found in the mouth and many pounds in the stomach: his diet seems to have included fir cones and branches, larch and pine, sedges, mosses, wild thyme, Alpine poppy and buttercup, and various grasses. It is interesting to find that seeds were attached to many of the plant-remains, showing that the mammoth's tragedy occurred in the autumn, presumably after the first snow-fall had bridged the mouth of the crevasse sufficiently to conceal the danger.

[1] The trunk of a young mammoth was found by Volosovitch in 1908. Another was obtained by a Tungu hunter in 1924 in the Kolyma district of Siberia. He sawed off the tip, which was dried and used as a table ornament by a Mme Kondratiev of Sredne-Kolymsk, in whose house it was noticed a few years later. The bi-lobate structure of the extremity of the trunk confirms the accuracy of such representations as those at Combarelles made by Upper Palaeolithic man. The absence of trunks from most of the mammoths found is due to their succulence; in nearly every case they were gnawed away by wild beasts prior to the discovery of the mammoths (see pl. IX).

(ii) Eskimo archaeology. The Danish explorers Therkel Mathiassen and Kaj Birket-Smith and the expeditions sent out from Cambridge have combined to throw a flood of light on the earliest settlement of the circumpolar region.[1] Thanks to the favourable conditions a great deal is already known of the winter culture of the Thule people, who during this season lived in semi-subterranean earth-houses roofed by wood or whale-bone heaped over with turf. Had we to depend on the hard residue, such as would have survived on a normal site in the temperate regions,—in this case a few flint and stone implements, blubber lamps and a few heads and blades of meteoric iron—our knowledge would not have reached its present stage so early, if ever at all. Fortunately, however, animal remains, highly perishable as a general rule, have here survived to an astonishing extent.

Over such an extensive area great local differences can naturally be observed in the completeness of refrigeration. In Greenland archaeological remains tend to be found in a more intact state as one travels north, since whereas in the Julianehaab district at the extreme south the January isotherm is 20° F. and the July figure as high as 45° F., farther up the west coast in the Melville Bay region the corresponding temperatures are as low as − 15° F. and − 37° F. At Melville Bay and even at the intermediate Disko Bay refrigeration is sufficiently effective all the year round to preserve all manner of objects made of wood, bone and baleen—harpoons, arrows complete with shafts, gull-hooks, leister-prongs, ice-scoops, sledge-runners and shoes, parts of umiaks and kayaks and their paddles, knives with their handles, bow-drills, needle-cases, thimble-holders, bodkins, wooden scraping-benches, trays, bowls, dippers, combs, trinkets, drum handles, dolls and toys of all kinds. In more southerly districts, on

[1] Therkel Mathiassen, *Archaeology of the Central Eskimo*. Copenhagen, 1927.

the other hand, the alternation of frost and thaw for part of the year is fatal to the preservation of many of these things, only the flint and stone-work surviving at all completely. On pl. X I illustrate a sealskin boot and a stone axe with handles and lashing of baleen from an old Eskimo house at Qilalukan, East Baffin Land, dug by Mathiassen.

Another circumstance of which excavators have to take account is that the completeness with which organic materials survive in such a region may vary in the same hut according to the depth in the infilling. Easily perishable remains may be entirely absent from superficial layers affected by thawing, but be found almost intact in the permanently frozen layers below. Describing the excavation of a refuse heap left by people of the Thule culture on the coast of Repulse Bay, north of Hudson Bay, Therkel Mathiassen says that in the top layer he found hardly anything other than stone objects, lower down bone and baleen also occurred, while the lowermost strata were rich in 'wood, feathers, flakes of walrus hide, bunches of hair, canine excrement, egg shells, ashes, slag, heather, all saturated with blubber'. We can well believe him when he tells us that 'on a quiet summer day when the mosquitoes swarmed and the effluvia of the refuse heap was thick, it was anything but pleasant to be at the bottom of an excavating hole!'

(iii) Scythian tombs in the Altai.—As a final instance of what cold can accomplish I cannot do better than quote some of the fascinating discoveries brought to light in Central Asia during the last ten to fifteen years.[1] I refer to the great tumulus burial grounds excavated by Colonel Kozlóv (1924–5)

[1] M. P. Griaznov, 'The Pazirik Burial of Altai', *Priroda*, no. 11 (1929), and *Am. J. Archaeology*, XXXVII (1933); Camilla Trever, 'Excavations in Northern Mongolia (1924–5)', *Mem. Acad. Hist. Mat. Cult.*, III. Leningrad, 1932; W. Perceval Yetts, 'Discoveries of the Kozlóv Expedition', *The Burlington Mag.*, April, 1926.

on the slopes of the Noin-ula Mountains south of Lake Baikal and by M. P. Griaznov near Pazirik in the Eastern Altai. In both cases the burials, of which only a small number out of hundreds have been excavated, are those of leaders of groups of steppe nomads, of a kind who move with their herds over immense though well-defined tracts of country, maintaining traditional burying-places, to which their leading men would be carried, if necessary, for hundreds of miles. The burials were enclosed in wooden chambers placed at the bottom of square pits 12 feet and more in depth. The low stone cairns which cover them appear to have acted as condensers of moisture, which found its way down into the chambers. At the same time the loosely heaped stones, being poor conductors of heat, allowed cold air to penetrate to the lowest layers of the pits—a process made easier by the vertical disturbances caused by tomb-robbers. The combined effect was to cause the formation of ice in the chambers during the severe winter months, sufficient to withstand the heat of summer. The tombs and their contents were thus maintained in permanently freezing condition.

Only one of the ten kurgans examined by the Kozlóv expedition has been satisfactorily excavated (by S. A. Teploukhov and G. J. Borovka). Nevertheless, and despite the previous attentions of robbers who ripped off the coffin-lids and plundered the bulk of the gold objects, the expedition found a wonderfully rich and varied collection of grave goods. As well as objects of relatively enduring materials, such as gold strips and rosettes from the coffins, a bronze mirror, censer and cauldron, iron arrows and horse-bits, ornamented jade plaques, amber beads and wheel-made pots, the tomb contained many highly perishable substances. These included wooden and leather saddles and carved wooden bridle hangings, lacquer bowls (red within, black outside and decorated with animal figures in gold leaf), harness ornaments

of horse-hair, a number of queues of black hair (some of them encased in scalloped silk covers, decorated with charms), as well as a splendid series of felts and textiles. Among the latter were articles of clothing, some intact, e.g. a silken robe trimmed with sable and a silk cap, but mostly damaged by tomb-robbers; thick felt shoe soles embroidered with silk; silk damask hangings, felt carpets and woollen cloths embroidered with silk, and many other hangings, bags and flags.

The presence of a Han mirror and of Han inspiration in some of the textile designs suggests that the Noin-Ula graves may in some instances date back to the first century B.C. From his study of the grave goods as a whole, but particularly of the embroidered designs, W. Perceval Yetts detects the presence of Scythic-Sarmatian (e.g. the motive of the fabulous beast attacking his prey in the rear), Siberian, Iranian, Hellenic and Chinese elements. The chief interest of the discovery lies in the light it throws on the breadth of the cultural contacts achieved by the nomad peoples of Central Asia nearly two thousand years ago—and the most important evidence for this was such that under normal conditions in a temperate climate all traces would long since have disappeared.

We owe it to Griaznov that the Pazirik barrow was scientifically excavated and adequately recorded. The grave lay at the bottom of a pit 4 m. deep and 7·2 m. square, covered by a stone cairn 2½ m. high and 50 m. in diameter. Three-quarters of the pit were occupied by two rectangular wooden chambers one within the other. Griaznov says that 'the inside appearance of the burial gave the impression that hardly a year had passed since its construction. The very timber out of which the burial chamber was built had not only preserved its original shape and quality, but had retained its fresh smell of pitch.' Robbers had removed the corpse for stripping, but on the wooden coffin the appliqué decoration of bird figures cut out of leather was intact, and on the

walls of the chamber a black felt carpet with appliqué decoration of tigers' heads in thin felt still hung from its nails of wood and copper. The ten chestnut mares, thrown into the portion of the grave unoccupied by the wooden chamber, were possibly its most remarkable feature: in Griaznov's words they 'were preserved so well that not only skin and hair, but muscles, and entrails with the remains of undigested food were found in them'. Evidently they had been killed by a blow from a sharp axe on the forehead and then heaped into the open grave in disorder. So perfectly were they preserved that their smallest features were easily recognizable: their coats were free from chafing and showed no signs of their use for any form of work; their manes and the upper portions of their tails were seen to be clipped; and the ownership marks on their ears were found to be distinct in each case, suggesting that they may well have been offered by faithful retainers to their dead lord. Not the least interesting part of the find was the harness, of which each horse was provided with a complete set. The perfection of its preservation was astounding. The saddles, which were placed over a square piece of felt to prevent chafing, each consisted of two soft pillows of felt and finely tanned leather stuffed with reindeer hair. Each was provided with belly-, breast-, and tail-strap and each had a fine thin felt cover decorated in appliqué work with scenes of animal combats. The breast-straps in their turn were decorated with plaques of cedar, carved into animal forms and gilded or silvered. The bridles, attached to simple iron or bronze bits, were covered with wood carved in low relief and likewise gilded or silvered. The trappings of two of the horses were distinguished by several extra features; leather cases for manes and tails; masks for their foreheads made of leather, felt, fur and gold leaf worked to represent animal forms; and provision bags of fur.

We can see in our mind's eye the dead leader borne on an ox-drawn cart—the remains of the cart and yokes were found heaped over the wooden chamber—to the traditional burial-place of his forebears high up on the mountain slope. We can almost assist at the building of his tomb and smell the timber as those who fashioned from it the coffin and the double chamber. The funeral hangings, the horses harnessed for the pleasure of the great one in the next world, we can see them all, so fresh that, as their excavator remarked, it seems incredible that it all happened some 2,000 years ago.

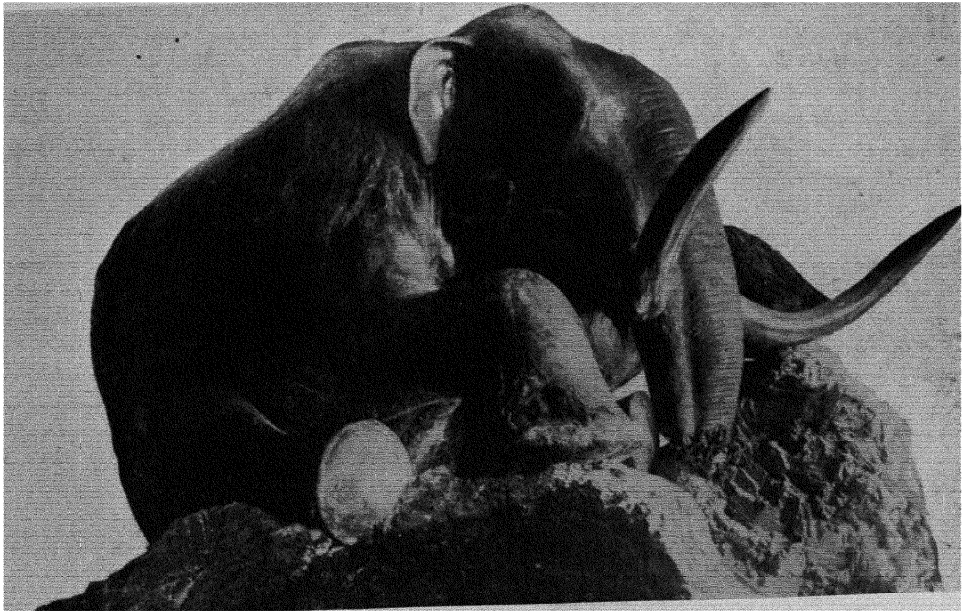
GEOLOGICAL CONDITIONS

The nature of the soil in which antiquities are found is a factor of importance. Indeed in a temperate climate it is often decisive. It may be true, for instance, that the Viking ships of Norway owe their preservation in the first instance to the dampness of the climate, but this would not have sufficed of itself, as is shown by their disappearance in other parts of Scandinavia with a similar climate. It was the clay in which the Gokstad, Tune and Oseberg ships were buried, supplemented in the last-mentioned by the packing of stones and the sealing layer of peat, that ensured their survival.

Occasionally it happens that the soil has positive properties that make for the preservation of organic substances without reference to climate. An extreme instance is that of the oil-bearing Miocene beds of the Ropizcze (*ropa* = crude oil) district of South-East Poland. Here at a place called Starunia a woolly rhinoceros of the type hunted and sketched by Upper Palaeolithic man was found by oil prospectors in an almost perfect state of preservation. All the circumstances suggest that it had been carried away by water after death. Probably the creature had been feeding in a deeply eroded valley when it was overtaken by swiftly rising flood-waters

and borne away by a strong current. By good fortune this particular specimen (and others along with it) seems to have been swept into a pool, beyond the normal reach of the river and saturated by salt and crude oil from the Miocene beds. The chemistry of the preservation process remains to be worked out, but oil literally poured from the broken bones and salt accumulated on the skin as the body was dried after excavation; possibly the condensed crude oil vapours helped to exclude the activity of bacteria and by permeating the skin the salt may have helped to preserve it.

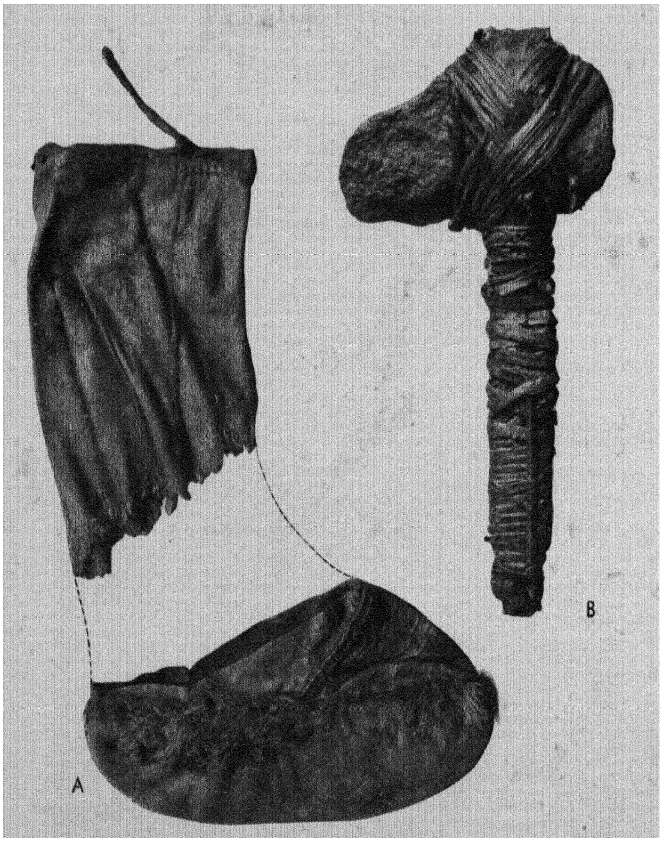
Whatever the cause there is no denying its remarkably perfect condition. The two horns and the hoofs are missing, but except for parts of one side, damaged while transported in the water, the skin is almost intact. The actual hairs were found embedded in the silt adjoining, but their original position on the body was shown by the cavities in the skin. The woolly rhinoceros evidently had long hairs at the back of the head rather like a wild boar, while his tail, broad and flat near the base but almost circular in section towards the tip, was provided with a broad tuft at its extremity with which to swat flies and other insect pests in the neighbourhood of the stomach. Examination of the skin revealed numerous scars, relics of fights with others of its kind. The eye region with all its numerous folds was beautifully preserved and even one of the eye-balls. Tongue, throat and palate and many of the limb muscles were in good condition, but the intestines had been washed out through a hole in the front part of the stomach; parts were recovered from the silt at a distance of some five feet. Round about the body were found the leaves and fruits of the typical tundra vegetation on which the rhinoceros thrived in lifetime, odds and ends washed in by the current—dwarf birch, small-leaved willow, various shrubs and *Dryas octopetala*, as well as numerous land and water beetles.



MAMMOTH FROM BERESOVKA, SIBERIA

(TEXT, P. 73)

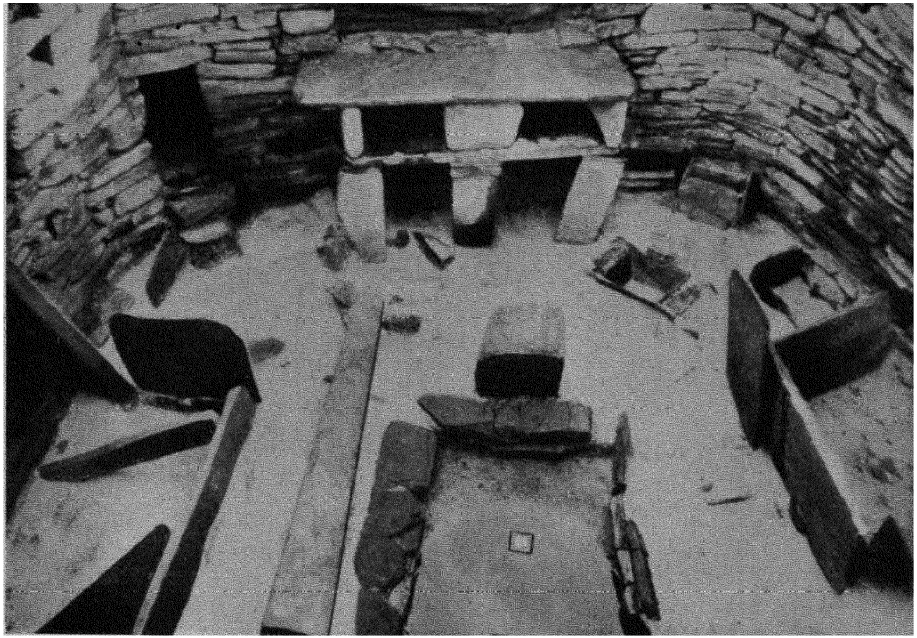
Note the attitude of the beast, as though endeavouring to extricate itself



After Mathiassen

SEALSKIN BOOT (*A*) AND STONE AXE WITH BALEEN HANDLE AND LASHING (*B*) FROM FROZEN HOUSE-SITES AT QILALUKAN, EAST BAFFIN LAND

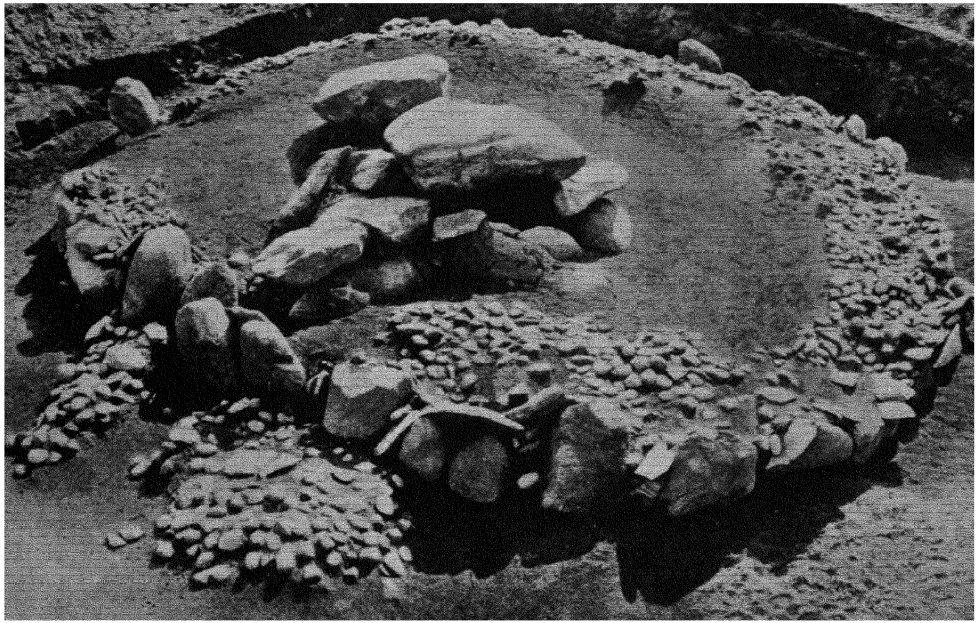
(TEXT, P. 75)



[*After Childe, photo Thomas Kent*

EXCAVATED STONE-BUILT HUT AT SKARA BRAE, ORKNEY

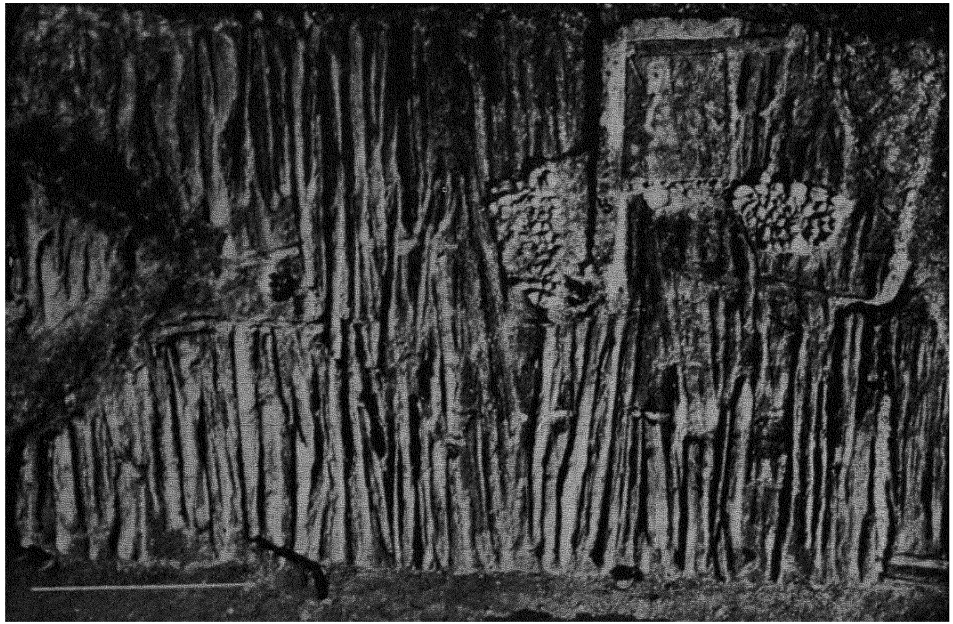
(TEXT, PP. 15, 82 AND 88)



[*After C. A. Nordman*

PASSAGE-GRAVE AT MEJLS, JUTLAND, WITH ITS COVERING MOUND REMOVED

(TEXT, P. 89)



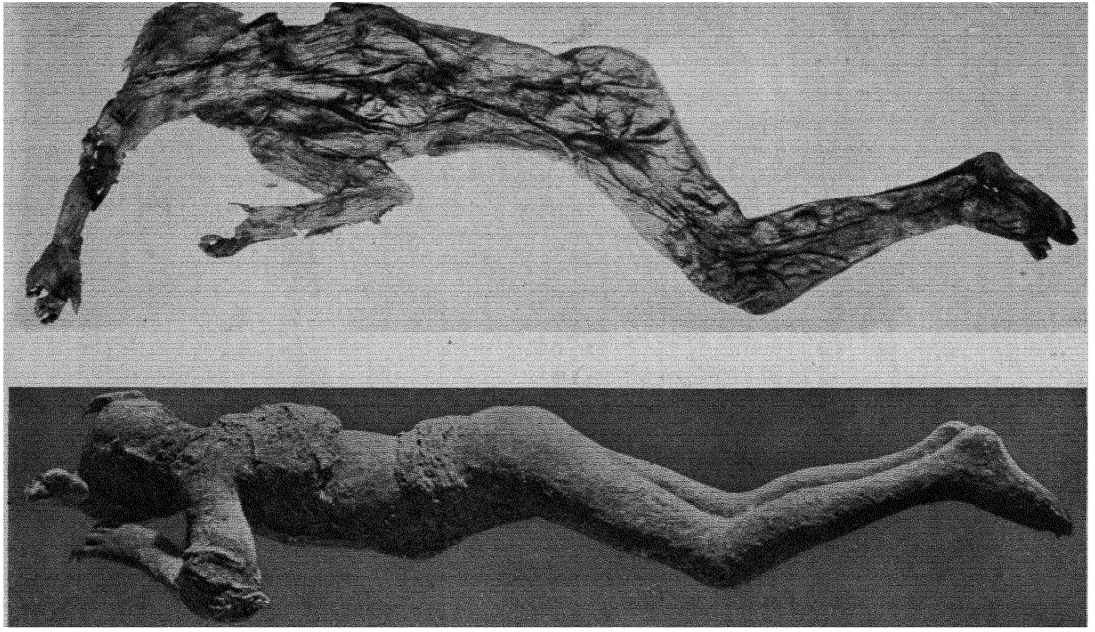
[*After R. R. Schmidt*

NEOLITHIC TIMBER HOUSE AT AICHBÜHL, BY THE FEDERSEE, WÜRTTEMBERG

(TEXT. PP. 64, 88, 90 AND 94)

(*a*)

(*b*)



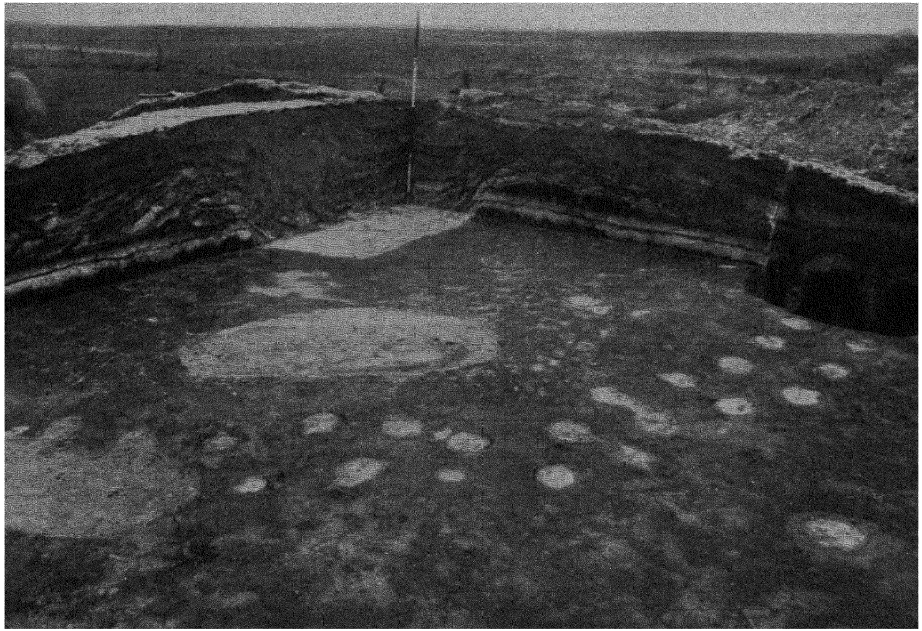
(*a*) EARLY IRON AGE CORPSE FROM A NORTH GERMAN BOG
(TEXT, P. 71)

(*b*) CAST OF AN ASPHYXIATED MAN FROM POMPEII
(TEXT, P. 92)

[*After Wheeler*

VIEW OF EXCAVATIONS AT MAIDEN CASTLE, DORSET, SHOWING THE ROMAN 'PRIEST'S HOUSE' OVERLYING AN EARLY IRON AGE HUT AND STORE-PITS

(TEXT, P. 93)



[After van Giffen

DUTCH PALISADE BARROW (WESSINGHUIZEN I) IN COURSE OF EXCAVATION
(TEXT, P. 98 AND FIG. 14)

Note old surface line with turves heaped over it; also graves and traces of timber palisade in plan and section

One instructive result of finding the Starunia rhinoceros is that in certain details, such as the shape and carriage of the tail, modern restorations can be shown to be less accurate than representations made by palaeolithic man in the cave art. But perhaps the artist who painted the woolly rhinoceros so boldly on the walls of Font-de-Gaume in the Dordogne was in some ways better equipped than the most learned of palaeontologists.

The preservation of Pompeii and Herculaneum under the mud and ashes rained down by Vesuvius in the eruption of A.D. 79, described by Pliny, is a dramatic event for which no immediate parallel can be advanced from prehistoric archaeology. Yet the gradual accumulation of geological deposits over early sites has certainly preserved to posterity much that would otherwise have been lost or at least gravely impaired. The mantle of loess which stretches intermittently from the Rhine to the Ordos desert has sealed down the open stations of Upper Palaeolithic hunting tribes, in South Russia even preserving the plans of their houses, the oldest artificial dwellings in the world. Rapidly forming peats and silts have served to enclose remains of the earliest post-glacial cultures of Europe, stratifying them at different levels and in some cases preserving such organic substances as wooden artifacts and even fishing-nets. Peat, by overgrowing and obscuring barrows, has saved many of them from destruction by ploughing, or mutilation by quarrying. The chambered tombs on Carrowkeel Mountain, Co. Sligo, and the Stripple Stones of Cornwall probably owe their survival to this cause, as certainly do the group of Bronze Age barrows and megalithic tombs discovered just before the Great War in the Kehdinger Moor in Hanover. Rapid peat formation has also played a big part in the preservation of wooden structures, such as the lake-villages of parts of Europe and of the British Isles.

Blowing sand, by covering sites in early times, has often been the means of preserving them. Aurel Stein had cause to bless the encroaching sands of the Taklamakan desert, just as British archaeology has to thank the dunes which engulfed Skara Brae in Orkney (p. 88 and pl. XI).

SOCIAL BEHAVIOUR IN THE PAST

That the behaviour of people in the past has influenced the degree to which their material culture has survived is sufficiently obvious, although too often ignored by archaeologists. Probably no single factor has been of greater assistance to archaeology than the care lavished on his dead by early man. The burial with the dead man of implements, weapons and adornments is responsible for the ' grave goods ', without which it is hardly possible to conceive the development of prehistoric archaeology. The construction of elaborate tombs, partly no doubt to commemorate the departed, but in large measure to safeguard his equipment from plunder, has served, rather ironically, to ensure a portion of the material to modern excavators. Inhumation burial with plenty of grave goods is the ideal from the archaeologist's standpoint : some cremations are accompanied by little more than cinerary urns and they imply, besides, the destruction of evidence for reconstructing human physical types. For most early cultures we know little or nothing of the burials of ordinary people and for some we have no burial evidence whatever : this is no wonder when we recall the many methods of disposing of the dead which, like tree-burial, cannot be expected to leave traces in the soil.

If the excavation of burials gave archaeology its flying start, it is settlement sites with their manifold social implications that provide the most promising material for the future. Clearly the nature of early man's settlements and dwellings

affects profoundly the kind of material remains available to archaeology, as they go far to determine the aspects of his culture most likely to be represented among excavation material.

The cold winters of late glacial times, which in the limestone areas of Europe drove hunting tribes to the shelter of overhanging rocks, greatly aided the development of Upper Palaeolithic archaeology. Frequent returns to the same shelter aided by crumbling of the overhanging rock have combined to make easy the observation of stratigraphy; the properties of the limestone have favoured the preservation of quantities of antler, bone and shell objects, in such condition that surface markings are well preserved; and inner recesses of the caves have sheltered from weather and human interference the engravings and paintings which give us so extraordinary an insight into the feelings and mentality of palaeolithic hunters living 20,000 years ago.

Thanks to their habit of camping in the summer months by rivers, lake margins, bogs and other wet places, the material culture of the Maglemose food-gatherers, who spread far and wide over the North European Plain from eastern Britain to the Urals, has survived in a remarkably complete form.[1] In addition to the 'hard residue' of flint and stone, all manner of perishable materials have come down to us—antler and bone axe and adze sockets and blades, leister-prongs, harpoons, arrowheads, net-making needles, bodkins and fish-hooks, wooden clubs, handles, sockets and paddle-rudders, string nets and bark net-floats. The contrast with what we know of the contemporary Tardenoisian culture[2] of the more southerly parts of Europe is instructive. Since these people dwelt predominantly on sand formations hostile to the sur-

[1] J. G. D. Clark, *The Mesolithic Settlement of Northern Europe*, Chap. III. Cambridge, 1936.

[2] *Ibid.*, Chap. V.

vival of organic remains, our knowledge of their material culture is limited almost entirely to objects of flint or stone. As for the Maglemose culture itself it is worth noting that only the sites chosen for summer settlements seem to have been favourable to the preservation of organic substances: the winter culture is still almost an unknown quantity.

With the development of a food-producing economy conditions tended to favour the survival of a higher proportion of the material side of early cultures. The tells which reflect the growth of city life in the Near East, the eastern Mediterranean and parts of south-eastern Europe, are one example. Formed gradually by mere accretion of the debris of human existence, such sites not only give fine stratigraphical sequences, but by sealing the different levels preserve their contents to archaeology. Tells have played a role as important as have caves in another sphere.

In north-west Europe the *terps* of northern Holland and the *wurts* of north-west Germany offer the closest analogies, but they differ in their mode of origin. Unlike tells, these mounds have been heaped up deliberately in successive stages possibly to cope with the onset of coastal subsidence, which is thought by some geologists to have affected the North Sea coast at that time. By excavating such sites van Giffen and his colleagues in Germany have not only obtained invaluable stratigraphical information, but have also been able to reveal in the lower levels timber and wattle houses, preserved almost intact by overlying deposits and the moisture of the sub-soil (pl. XXIII). The habit of living on pile-dwellings over water is another for which archaeologists have to be thankful, since lake-bed deposits are well adapted to the preservation of vegetable remains. The neolithic inhabitants of Switzerland could hardly have been more obliging.

It is a paradox that the best chance of organic material surviving in the ordinary way is that it should be destroyed

by fire, but such remains, in being converted into carbon, acquire enormously enhanced powers of resistance. Clay daub, a material much used in primitive structures, also gains by a good firing. It was certainly the experience of Professor Hatt digging Early Iron Age houses in Jutland that, only in the cases of those destroyed by fire, could he hope to recover details of the structure. Those abandoned to the processes of natural decay disappeared so completely that only the barest outlines were recoverable by excavation. Burnt houses, on the other hand, were clearly defined by charred stumps, traces of roofing materials would be found lying charred on the floor, and indications of wattle impressed on the burnt daub. Even wooden utensils were recovered in charred fragments. It is amusing to compare with this the testimony of an excavator of Pueblo ruins in the south-western states of North America, who wrote of a burnt house in Colorado :

> the mud was baked to a brick-like consistency which thus far has withstood the actions of erosion to which it has been subjected during the centuries . . . had it not been for this firing the adobe [mud] would have melted back into the earth from which it was taken and the unprotected poles would have decayed and fallen into dust. In many instances the timbers are no longer present, it is true, but their imprints are ineffaceably preserved in the hardened plaster.

So, it may be concluded, do archaeologists, by disinterring the dead and by uncovering the ashes of burnt-out habitations, turn to profit the tragedies of past ages. Yet it is through death and destruction that generations of men remote beyond the verges of history have come to life again in the consciousness of humanity, and it is the spoiling hands of the archaeologists that confer immortality upon them.

CHAPTER IV

EXCAVATION

EXCAVATION is the central stage in the process of archaeological research, forming an essential link between discovery and interpretation. There is thus a very real sense in which the spade is the trade-mark of archaeology. In practice there is a tendency for archaeologists to specialize, it may be in field-work, it may be in interpretation ; but the archaeologist with little or no experience of excavation is ill qualified to interpret the results of other people's digging.

In his work the excavator has two primary aims : to recover and record the form of an object or site, and to trace stages in its development. If it is convenient to consider the two aspects of his work separately, it must be remembered that in practice these are indissolubly linked together.

MORPHOLOGY

Certain obvious principles apply to all types of archaeological excavation, such as the paramount importance of accurate methods of survey and record, but their successful application depends upon full appreciation of the conditions obtaining at particular sites. Different soil-conditions, varying degrees of preservation and a hundred and one local factors connected with the state of the site help to determine the way in which the excavator will have to solve his problem. Rigid adherence to some theoretical ' excavation technique ' is hardly likely to bring success any more than will the most earnest

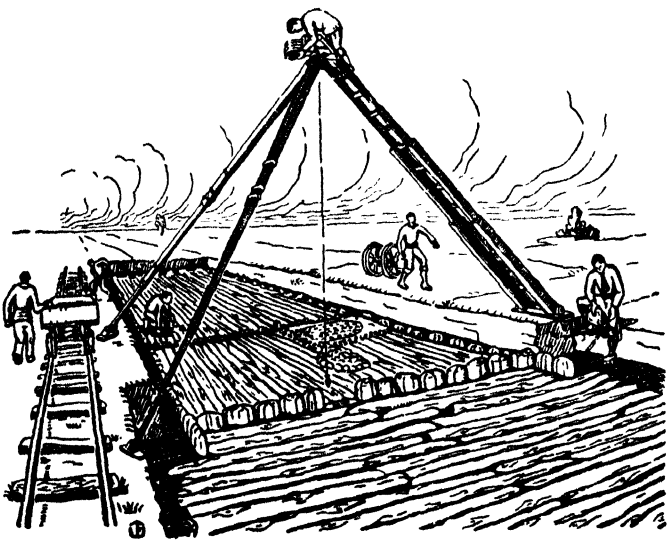
perusal of this or any other book to any one not possessed of the saving qualities of observation, pertinacity and adaptability.

In the final analysis excavation methods, as applied to the elucidation of morphology, fall into two main classes : those which consist essentially in isolating what, owing to its enduring material or to the existence of conditions peculiarly favourable to preservation, has survived more or less intact, and those which aim to recover the shape of what has ceased any longer to exist in tangible form.

Well preserved sites. As a general rule these are the more straightforward, often involving little more than the removal of overlying material and the exposure of easily recognizable features. Yet, within this category there are obvious gradations of difficulty. Buildings of brick and masonry, like those of the ancient civilizations of the Near East (pl. XXII) or of the Classical World, including Roman Britain, are from the morphological point of view the easiest to excavate. Much of the superstructure will, as a rule, have disappeared, but the recovery of the ground plan, where walls have not been seriously robbed, should present few difficulties. Even where extensive robbing has taken place the regularity of such buildings tends to make easier the reconstruction of what has disappeared.

Dry-stone constructions, on the other hand, such as abound in prehistoric Europe where suitable material is available, and in certain backwaters persist to the present day, offer slightly greater difficulties. In the absence of any form of cementing material the collapse of walls and other features is more general, while the frequent absence of any form of dressing increases the difficulty of reconstruction and may even make it hard to distinguish between stones in their natural position and those relating to a ruined structure. The innumerable hut-circles and fortified sites of the Highland Zone of Britain have, however, been excavated chiefly by the simple process of

isolating structural features composed of hard and enduring rock. An outstanding example is the Stone Age village of Skara Brae in Orkney.[1] Here by the mere removal of overlying sand were recovered not only the form of the houses, but, thanks to the extensive use of stone, many details of



[*After R. R. Schmidt*

FIG. 9

Excavation of a Neolithic house at Aichbühl, Federsee (cf. pl. XIII)

their furniture. The huts themselves are sub-rectangular in plan, having rounded corners. As a rule they have only one door and no windows, being connected with each other by roofed passages. The hearth is set in the middle of the floor and is kerbed by low stone slabs (pl. XI). On either side are the beds, box-like structures formed by stone slabs, once filled no doubt with grass or heather bedding. Recesses above

[1] V. G. Childe, *Skara Brae*. London, 1931.

probably served as receptacles for personal possessions and trinkets. At the rear end of the huts are elaborate stone dressers with two tiers. Cubical boxes let into the corners of the floors may once have contained limpets.

In some ways the most interesting constructions of unmortared stones in prehistoric Europe are the megalithic tombs of the western Mediterranean and the Atlantic sea-board (pl. XII). Here the successive attentions of tomb robbers and

[*After Schmidt*

FIG. 10

Reconstruction of the Neolithic lake-side village at Aichbühl

antiquarian diggers have created some of the chief difficulties in the way of modern investigators. The burial chambers are as a rule formed of comparatively few large slabs, so that their form may be affected profoundly by the movement or destruction of even one or two stones. It is thus necessary when researching on megaliths to recover the early history of investigation of the monument on which one is working and in particular to examine successive plans. In the field one has to decide how far the existing arrangement of stones is original, how far it has been subject to disturbance. Where stones have been removed one can often recover their exact positions by finding their socket-holes through excavation.

When wooden structures survive, as they do by the Federsee or the Swiss Lakes, they offer little difficulty so far as the ground-plan is concerned (Fig. 9 and pl. XIII). Sometimes even the walling and roofing material can be found collapsed on the floor, but usually the superstructure has to be inferred from the arrangement of posts and the footings on the ground (Fig. 10 and pl. XIII). Wooden remains which owe their survival to water-logging have, however, one serious drawback; they may, when uncovered, appear to be as fresh as if they were new, but they tend on drying to deteriorate rapidly. The excavators of Glastonbury wrote that:

> After a few hours' exposure a pile was scarcely recognizable; its fresh light colour was soon transformed to an inky-grey, and in proportion to the rapidity with which the moisture in the wood evaporated, so did the post crack longitudinally, shrink and warp, until it was about one-third of its original diameter and size.

It can readily be imagined how serious these processes would be if they were allowed to attack such objects as bows, wooden vessels or furniture. The remedy is, of course, appropriate treatment in the field. Preservation has literally in such cases to go hand in hand with excavation.

Methods have naturally to be adapted to local conditions. In dealing with mammoth remains at Upper Palaeolithic sites in Moravia, Absolon found by experience that it was best first of all to remove the loess soil in such a way as to leave the bones exposed on supporting pillars. Then, having treated them with a hardening mixture (Mollison's tincture), it was a simple matter to saw them off and pack them in cases for transit to the museum laboratory. Wooden objects, so long as they are kept moist, can be made to retain their shape almost indefinitely. But for exhibition purposes, especially when it is desired to fit several pieces together, it is necessary to dry and harden them in such a way as to avoid shrinkage and

cracking. A notable example of what can be done in this way is afforded by Professor Gustafson's treatment of some of the wooden objects from the Oseberg Viking ship, familiar to many visitors to Oslo (pl. XIX). By boiling objects in a solution of alum and then drying them and impregnating them with linseed oil, he succeeded in preserving them without loss of shape or volume so effectively that he could rebuild them to their original form and dimensions. This task was not a light one. It is difficult to believe that one of the finely carved sledges consisted, when excavated, of no less than 1,068 pieces of soft wood, each of which had to be treated separately. The restoration of this one sledge alone took over a year. Despite the experience of the staff, the authorities of the museum at Oslo have still thought it wise to preserve some of the finest carvings in water, suitably treated to discourage organic life. No amount of skill can eliminate all chance of disaster, and where very precious remains are in question, preservation in a liquid is still the safest method to adopt. Where, as so often happens in Egypt and the Near East, one has to deal with elaborately inlaid objects, the mastic of which has been dissolved by moisture or shrunk by dryness, special treatment, such as the application of wax, has to be improvised in the field so as to get them to a museum reasonably intact. Elaborate arrangements of beads, the original threads of which have of course long since vanished, impose a further strain on the patience and ingenuity of the excavator. One can only emphasize that, whatever physical means are adopted to solve such difficulties, there can be no substitute for detailed notes made while the finds are still in position as found.

The excavation of sites where archaeological remains are on the whole well preserved has its own special problems, although these are mainly of a practical nature. Where all tangible remains of actual structures, bodies, material objects and the like have disappeared, leaving behind them only the

merest traces, the archaeologist has, however, to rely on hi powers of detection : for want of concrete remains he has t be content with such indications of their former existence as hi technique is able to demonstrate. There is an element of ar in the excavation of the average prehistoric site, which i lacking in the case of a Roman villa with its four-square wall and hard floors. Perhaps it is this, more than anything else which makes the average prehistorian so scornful of hi Romano-British or Gallo-Roman colleagues, who in turn pride themselves on a scientific accuracy beyond the reacl of their benighted brethren ! The difference of outlook i determined in large measure by the difference in the nature o the problems to be solved. It is rather like the contras between driving a lorry on the open road and driving a engine on rails.

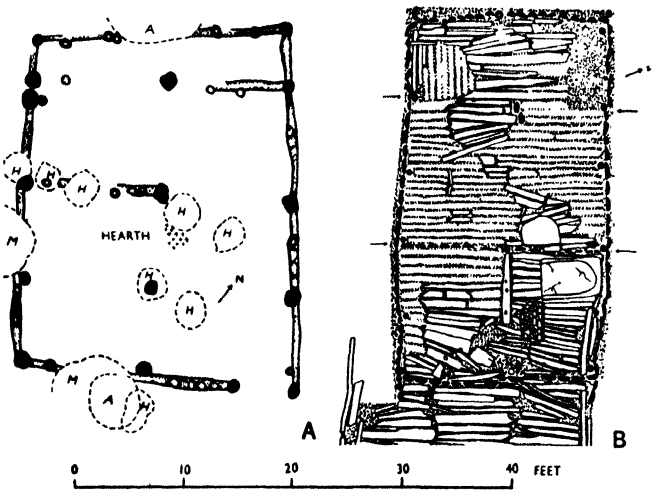
Ghost sites. The indications available to the excavator o a ' ghost ' site naturally vary according to the nature of th soil and the character of what he is after. Where the sub-soi is solid or relatively compact he will rely mainly on casts Sometimes it is possible by pouring in plaster to obtain a exact cast of what has decayed. Visitors to Pompeii wil probably remember in the museum there a number of gypsun casts made by pouring liquid plaster into the moulds forme by volcanic ash raining down on to the corpses of asphyxiate men and dogs (pl. XIV). Sir Leonard Woolley used th method to advantage at Ur, where the conditions of preserva tion were rather poor. One of his triumphs was to recove the number of strings in the harp buried in one of the roya tombs with Queen Shub-ad.

As a general rule, however, the excavator will have t be content with such indications of former structures as ar indicated by the holes dug to receive posts and the slots cu to contain wall-footings. Where the sub-soil is sufficientl solid, as in chalk and, under favourable conditions, gravel, th

usual method is to remove the topsoil and expose the virgin rock ; ancient disturbances will then reveal themselves owing to the different colour and consistency of their infilling. If any difficulty is found in distinguishing such features, exposure to the weather will often prove effective, but no general rules can be laid down. Local conditions are of such predominating importance that personal experience is the only real guide. When post-holes or sleeper-trenches have been revealed it is important in excavating them to note any variations in their infilling ; it is often possible to discover by careful observation the actual diameter and form of timbers as distinct from the holes made for their reception. A good idea of the appearance of a chalk surface stripped of its topsoil is given by pl. XV from a photograph taken at Maiden Castle, Dorset, in 1934. Ancient excavations, including rain-water gullies (?), storage-pits and the post-holes of a hut, dating from the Early Iron Age, have been cleared of their filling. The contrast between the prehistoric hut, all tangible traces of the walls and even main posts of which have long since vanished, and the well-preserved wall-base of the rectangular stone-built dwelling, probably the house of the priest of the nearby temple, is strikingly illustrated.

To the casual visitor it may sometimes look as though excavators spend most of their time digging holes on their own account, and the rest speculating about the meaning of grubby little markings which seem incapable of conveying anything to any one. If such a person, instead of standing on the edge, got down and lent a hand at the work, he might, after a few weeks, grow less sceptical. But perhaps it is simpler to give archaeologists some credit for knowing their business. After all it is not every one who can identify finger-prints ; the interpretation of archaeological traces is equally a matter of skill and training. No one in his senses would pretend that, working on a chalk site, from which

every vestige of organic material save a few bones and charcoals has disappeared, even the most expert excavator could hope to find out as much about timber houses, for example, as he would if he were digging a lake-village. Still, with a knowledge of the real thing, such traces as a chalk surface is



[*After Bersu and Schmidt*

FIG. 11

Houses of the Aichbühl people as found on the Goldberg and by the Federsee; the former in 'ghost' form, the latter with ground-level timbers intact

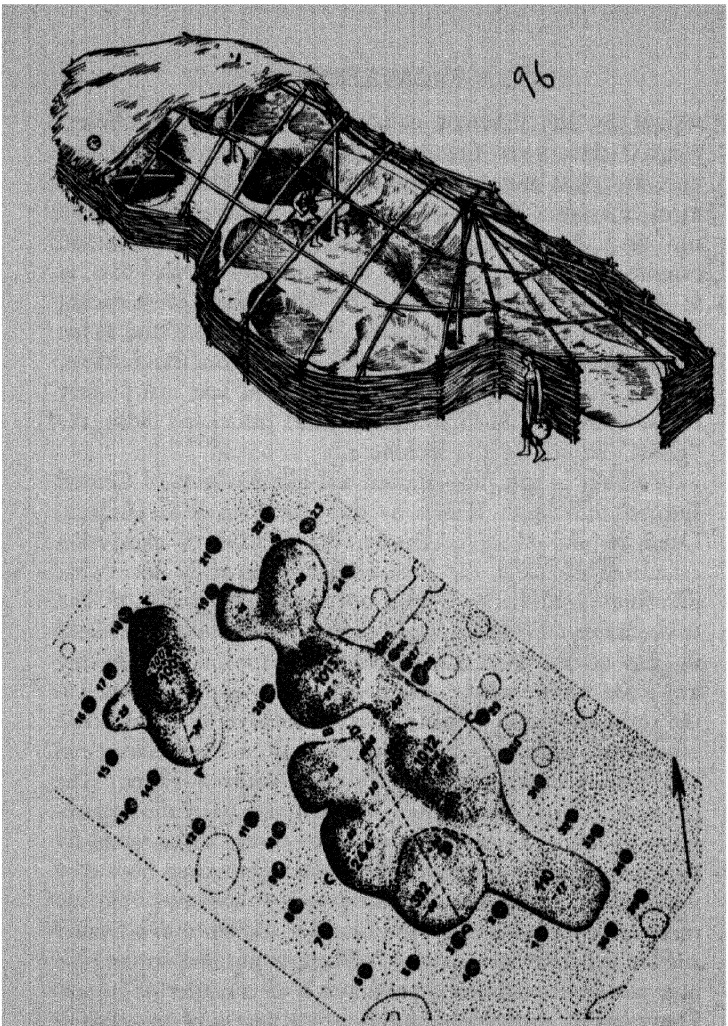
capable of revealing are often sufficient to give a fair idea of what formerly existed. This can be illustrated neatly by comparing the timber houses uncovered at Aichbühl (pl. XIII, Fig. 11, B) on the shores of the ancient Federsee with the traces exposed at the famous site on the Goldberg,[1] nr. Neresheim, Württemberg (Fig. 11, A). The post-holes and wall-slots cut in the chalky sub-soil were easily defined after the removal of

[1] G. Bersu, *Germania*, 1936, 229–43.

topsoil by the different colour of their infilling. When planned they were found to indicate houses of the same general type as those at Aichbühl, having the same rectangular form, the same central row of posts indicative of a gabled roof and the same internal division. Moreover, a careful examination of the infilling of the wall-slots showed that, as at Aichbühl, the convex sides of the timbers were facing outermost. Although not a scrap of timber was found at the Goldberg, there can be no reasonable doubt about the character of the dwellings. In confirmation it can be said that pottery characteristic of Aichbühl was found associated with the 'ghost' houses on the Goldberg.

Working in soft, fine-grained soil like the loess of Central Europe and South Russia or the glacial sands of Holland, Denmark and North Germany, the method of excavation calculated to yield the best results is naturally somewhat different. Instead of clearing out post-holes, wall-slots and so on, as one would do in chalk country, these are now revealed in plan as discolorations by removing topsoil and shaving away the surface of the virgin soil. The implement used is the ordinary spade of the country, mounted at a low angle on a long handle, which allows one to shave the surface clean and flick away the shavings almost without effort. The character of surface markings, which result from the replacement of timber or bone by soil, is of course to be tested by sectioning them vertically. It will be appreciated how easy it would be for an unobservant person to dig away the site of an ancient house or fail to notice the existence of a former timber structure in a barrow. There is nothing so tangible as a post-hole cut in solid chalk; it is all a matter of colour. Under such conditions destruction is a necessary accompaniment of excavation and adequate recording becomes more than usually important.

The excavations carried out by Harberey and Buttler at



[*After Buttler and Harberey*

FIG. 12

(*Upper*). Restoration of dwelling-house at Köln-Lindenthal, the great Danubian (Neolithic) settlement

(*Lower*). The plan as revealed by excavation

Note deepening of floor and surrounding post-holes

Köln-Lindenthal, a settlement of 'Danubian' (Neolithic) peasants on a loess patch near Cologne, show what can be done by using the shaving method.[1] In all something like 35,000 square metres were cleared and examined, disclosing the plans of dwelling-houses, domestic granaries on piles and large rectangular field-barns. A general view of the site as it must have appeared at the height of its glory is given by Fig. 24. Meanwhile, Fig. 12 shows what a single dwelling-house looks like on the ground after the excavation of a

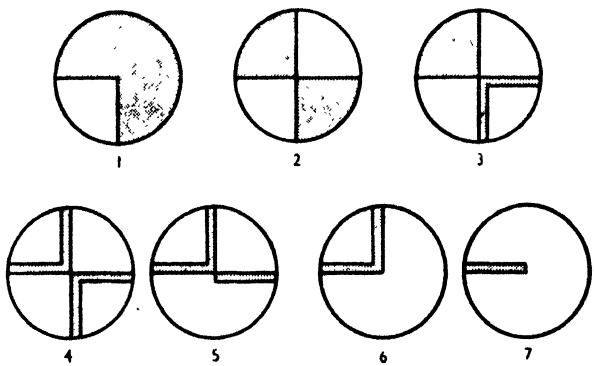


FIG. 13

Diagram illustrating the quadrant method of excavating round barrows

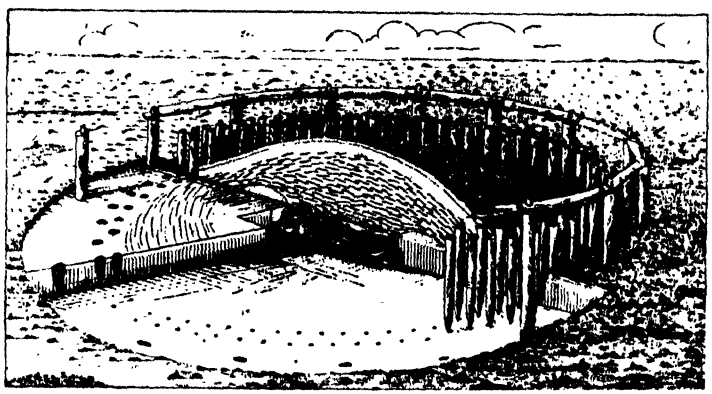
complex of colour markings. The reconstruction of the same dwelling, although based solely on the interpretation of colour-markings, is probably substantially accurate.

The ideal at which the excavator should aim is to expose as many sections as possible while gradually revealing the plan. For dealing with round barrows with internal structures of timber Dr. A. E. van Giffen of Groningen has evolved what he terms the 'quadrant method'.[2] The first stage consists of

[1] Harberey and W. Buttler, *Die Bandkeramische Ansiedlung bei Köln-Lindenthal.* Berlin, 1936.

[2] A. E. van Giffen, *Die Bauart der Einzelgräber.* Leipzig, 1930.

removing the mound in such a way as not only to reveal, but to retain sections, while the plan is being recovered ; successive stages in the process are shown in Fig. 13, while pl. XVI illustrates the appearance of a barrow after removal of one quadrant. As the reconstruction of this particular barrow shows (Fig. 14), an astonishingly adequate idea of the structure of the mound has been obtained, although nothing more tangible than colour differences remained.



[*After van Giffen*

FIG. 14

Reconstruction of a Dutch palisade barrow at Wessinghuizen (cf. pl. XVI)

Note. The lintels and the heights of the posts are hypothetical.

An experienced barrow digger in such a region will not, however, stop short at this stage. He will endeavour by examining the graves to discover as much as possible about the burial. The Early Bronze Age people of Holland who heaped the mounds with timber palisades over their dead, buried them in oak coffins, presumably fully clothed. But, whereas the coffins and their contents have survived in astonishingly fresh condition in southern Jutland and Schleswig, conditions have been so much less favourable in Holland that nothing of the coffin survives beyond a dark smudge in the

sand. Such traces of wooden coffins have been found again and again under Dutch barrows. Needless to say the clothes have left no trace, but skeletons, whether buried extended in a coffin or contracted without one, have frequently been observed as dark silhouettes showing up clearly against the pale sand. The contrast between a contracted skeleton and a sand profile in the same attitude is illustrated by pl. XVII ; in the former case all the excavator had to do was to brush the bones free, taking care only to avoid disturbance ; in the latter he had delicately to shave away the sand, keeping a sharp look-out for suspicious markings. It is important to establish the attitude of burials, not only as an end in itself, but also with a view to establishing how ornaments, buttons and pins were worn.

Intermediate sites. At the vast majority of sites remains of buildings and of smaller objects are neither so intact that they have only to be isolated from their encompassing material, nor so completely decayed that nothing tangible remains. Sometimes one and the same site will exhibit a complete range of states of preservation, requiring widely different modes of excavation. A famous instance is the wooden settlement at Hedeby, near Schleswig, which in Viking times served as an entrepôt for the trade between Western Europe and Scandinavia. The houses in the lower part of the town, near the shore of the vik, being well preserved, were dug by the straightforward isolation method. Those on the 'high and dry' portions of the site, however, had so far decayed that excavation by the shaving method, such as was used at Köln-Lindenthal in the Rhineland, was the only one available. Between the two extremes was a wide range calling for numerous variations in the mode of excavation.

Again, it very frequently happens that both buildings and loose antiquities are made partly from perishable, partly from imperishable substances, so that in their excavation both

methods have to be employed at once. Stone constructions, if intelligently examined, will often give indications, it may be in slots or socket-holes, of wooden components which have since disappeared. Conversely, wooden structures, especially in such countries as Denmark where there are plenty of glacial pebbles and boulders, often have stone-built features, such as paving before the entrance, post-hole linings, and wall footings (pl. XVIII). Even when the timbers have vanished completely a few stones arranged in this way may give the clue to the general form and dimensions of a structure.

The same principle applies to the Viking ship burials. When the wood has disappeared the iron bolts remain to preserve the form of the ship. The aim of the excavator must be to observe such colour traces as exist and above all to note the relationship to these of any metal parts which have survived. An outstanding example of what can be done in this way is given by the recent excavation of a Viking ship at Ladby in Fyen, the only one yet discovered in Denmark. Thanks to the munificence of Mr. P. H. Mikkelsen of Odense, the ' ghost ' ship of Ladby can still be viewed under its original mound. To any one who has gazed on the Oseberg ship (pl. XIX) and its rich furniture it is something of an experience to see what the skill of excavators has achieved at Ladby. Of the timbers of this rapid boat, 22 metres long but only 3 metres wide, only a few slight traces can be seen, but some 2,000 iron bolts are still in position (pl. XX, upper). The mast had long since gone, but iron shroud rings in position on the gunwales showed that it must have been somewhere amidships. The dragonhead prow itself has gone the same way as the hull, but a dozen iron spirals arranged along the crest of a dark marking in the soil show the line of its mane (pl. XX, lower). Although robbers dragged away the Viking before stripping off his finery, the skeletons of eleven horses and the bones of several dogs remain as witness that he was sent on his last

voyage with the companionship of his favourite beasts. As for the wooden and textile furnishings of the ship, these must be restored in the imagination nourished with memories of the Oseberg and other ships found under happier conditions.

What is true of larger monuments applies equally to smaller objects : implements and weapons tend to lose their handles, shafts and sheaths, beads their strings, and clothing everything but its fastening pins or buttons. Sometimes it is possible to recover in the form of a hollow cast or a soil-stain the actual shape of what has perished. Failing this, observation of the exact positions of surviving parts will sometimes be equally effective ; this applies with special force to grave groups where the relationship of ornaments to skeletons or their surviving earth-stains will sometimes give the clue to their use. It cannot, indeed, be urged too often or too strongly, that in excavation the positions in which objects are found and the records made of them are liable to be of far more importance than the objects themselves.

SEQUENCE

Whenever settlement sites or burial places were used over any length of time they were liable to undergo a process of development which it is the archaeologist's business to unravel. He must try and find out, not only what a hill-fort or a burial-mound looked like in its final form, but the stages through which it passed in its life's history. In so doing his guiding principle will be the elementary geological law of superposition, by which younger deposits overlie older ones.

Caves. This is exemplified in its simplest form in the excavation of inhabited caves or rock-shelters. Having ascertained by preliminary trial trenches the whereabouts of the richest deposit—normally in or near the cave mouth—

and having established the general sequence of deposits, it is then a comparatively simple matter to remove them one by one and so obtain a series of industries from the youngest to the oldest immediately above bed-rock (pl. XXI). Theoretically, that is, it is a simple matter. Actually every cave will turn out to have its own peculiar snags and difficulties, not to speak of the discomforts of working in a confined space, not unseldom exaggerated by damp and darkness. One has to beware against the disturbing effects of burrowing animals, of early man himself, and of previous explorers. Careful removal of badly mixed deposits layer by layer would be a serious waste of time, while their interpretation as a true stratigraphical sequence would land any one in a difficult position.

The ideal cave is one in which many archaeological levels are present, each being clearly separated from its neighbour by undisturbed natural deposits, preferably stalagmite or some other hard substance calculated to discourage burrowing animals. These conditions were perhaps better fulfilled at Castillo, near Santander in North Spain, than anywhere else. When first discovered the cave was so filled with debris that a normal person could hardly stand upright; early man had lived in it until his rubbish had, together with natural accumulations, reached very nearly to the ceiling of what had once been a lofty cave. When Obermaier and Wernert and their assistants removed the contents layer by layer (1910–14), they were gratified to find almost every stage of western European prehistory represented from Eneolithic down to Lower Palaeolithic. In all they removed deposits to a maximum depth of 59 feet! The final section was as follows:

	Modern
	Stalagmite
ENEOLITHIC	Eneolithic
	Stalagmite

MESOLITHIC	Azilian
	Stalagmite
UPPER PALAEOLITHIC	Upper Magdalenian
	Loam
	Lower Magdalenian
	Loam
	Solutrian
	Loam
	Upper Aurignacian A
	Loam
	Upper Aurignacian B
	Loam
	Upper Aurignacian C
	Loam
	Middle Aurignacian
	Stalagmite
MIDDLE PALAEOLITHIC	Mousterian A
	Loam
	Mousterian B
	Stalagmite
LOWER PALAEOLITHIC	Acheulian
	Loamy breccia
	Limestone rock

(After Obermaier)

Tells. Somewhat analogous conditions exist at the sites of many of the earliest villages and cities of the higher civilizations of south-eastern Europe and the Near East, inhabited through centuries and even millennia, often with little break. But, whereas caves were visited sporadically by food-gathering groups between whose visits geological deposits often had time to form, the material composing the tells consists almost entirely of the debris of settled communities. That is not to say that settlement on such sites was entirely uninterrupted; on the contrary it is episodes in their history, destruction by fire or razing by an enemy, that give the clearest evidence

for making divisions in their stratigraphy. After a major disaster the site would be prepared for re-building by levelling the debris and so a new city might arise on the ruins of the old. This, together with the day-to-day accumulation of rubbish (at Troy some of the houses had as many as nine super-imposed floors, entailing a raising of the roof—one alternative to sweeping the floor !), caused the gradual heightening of level and the formation of the mound. Where a site was fortified its growth naturally entailed successive rebuildings of the defences, often on entirely new alignments. It is by using such indications as these, together with super-imposed buildings, layers of burning and of refuse and the like, that Dörpfeld was able to distinguish the famous ' Nine Cities of Troy '.

In excavating a huge site like Ur it is naturally impracticable to remove the whole mound, although, as the R.A.F. air-photograph taken early in 1930 shows (pl. XXII), Sir Leonard Woolley and his associates managed to uncover an astonishing extent of building. By planning the uppermost level of the Temenos, digging down and planning again, they were able to trace the modifications and rebuildings of the chief temples up to 530 B.C. For four years much labour was expended on the excavation of the Royal Cemetery (3500–3200 B.C.), some of the principal tombs of which yielded a wonderfully rich assemblage of grave goods. But most impressive from the stratigraphical viewpoint was the shaft sunk down to the pre-flood level.[1] The full significance of the section so revealed can be appreciated from the fact that it was dug at a point where the deposits of the historical period had been eroded. Yet approximately 59 feet of archaeologically productive deposit had accumulated prior to the First Dynasty of Ur (3100 B.C. ± 100 years). The following gives a simplified version of the succession :

[1] *Ant. J.*, 1930, 329.

Depths	*Strata*	*Correlations*
+ 17 metres	Ground level	1st Dyn.
	Building levels :	
	A, B, C	Royal tombs
	D	
	E	
	F	
	G	
	H	
+ 10 m.	Ash stratum with successive kilns and quantities of sherds : 11·2 to 12·2 m. to 4·5 m.	Jemdet Nasr al-'Ubaid II-III
+ 4·5 m.	Flood stratum of clean water-laid sand, with graves sunk from higher levels	
+ 1·5 m.	Refuse layer with habitations of brick and wattle and daub	
0	Sea-level	al-'Ubaid I
	Mud with ' scatter ' of sherds from neighbouring island	
− 1 m.	Stiff green clay with reeds : the floor of the marsh	

Terps. Settlement mounds or tells are a commonplace feature of Greek and Middle Danubian prehistory, but seem to call for no special comment. The ' terps ' and ' wurts ' of the low-lying coastal fringe from North Holland to western Schleswig-Holstein are, however, of rather special interest, since they seem to have been heaped up by throwing clay, turves or dung over the abandoned level, possibly to off-set the effects of subsidence. One result of their rather special position has been that in excavating them widely varying

methods have to be used. For the uppermost levels it is a case of shaving the soil to discover colour markings; lower down traces of timber-work will survive; while at the base the excavator has only to clear the floors and lower courses of well-preserved timber houses and barns. The most famous of these sites yet investigated is the large terp on a fifth of which the present village of Ezinge stands. Dr. A. E. van Giffen, who dug part of the site between 1931–4, was able to distinguish six main phases from the top downwards:[1]

I	*a*, *b* Clay	Thirteenth cent.—Ottonian Early Med. and Late Carolingian
	c Burnt layer with pit dwellings	Anglo-Saxon
II	Clay with dung on the outer margin. Large rectangular houses	Merovingian—Late Roman
III	Clay. Long houses divided into three by two rows of posts	Early Roman—Late La Tène
IV	Dung. Similar, but smaller houses	Late—Middle La Tène
V	Primary mound of turf	
	Numerous small rectangular houses	Middle—Early La Tène
VI	Settlement on virgin soil	
	Dwelling-house and pile-built granaries, enclosed by fence	Early La Tène

The original mound, a reconstructed view of which is given in Fig. 15, only attained a height of 1·2 metres above the general level of the water-meadows and did not exceed 35 metres in diameter. As the terp grew it covered a progressively bigger area, until by the thirteenth century it reached a height of 5·5 metres and a diameter of 450 metres. Some idea of the conditions revealed by excavation can be obtained from pl. XXIII, taken near the centre of the Ezinge site on

[1] *Germania*, 1936, 40.

which the church of the modern village now stands. The lowermost house (A) belongs to phase VI. The low section exposed immediately behind it gives the thickness of the original turf mound, on which were built the houses of period V (B). In the right background the upper levels of the terp can be seen in section (C).

Open settlement sites. Over most of western Europe pre-

[*After van Giffen*

FIG. 15

Reconstruction of the Ezinge 'terp' at an early stage in its history. The dwellings belong to the fifth period, counting from the top downwards (cf. pl. XXIII)

historic sites from the Neolithic and later periods tended to develop on rather different lines, through the enlargement, diminution, elaboration or simplification of their plans. In seeking to establish the main stages in their growth the archaeologist will not, indeed, neglect stratigraphical evidence, but this he will utilize mainly as a subsidiary to his study of the general lay-out of the site. For instance the pronounced kink

in the outline of Maiden Castle, Dorset, would suggest to any one looking at the plan for the first time a stage in its history when the hill-fort was more or less confined to the eastern knoll of the hill-top. The low bank joining the two kinks would confirm this impression in the case of any one visiting the site. It is not surprising that, when Dr. R. E. M. Wheeler started digging in 1934, this was one of the first things he tackled.[1] He was soon able to demonstrate that the earliest Iron Age settlers had contented themselves with enclosing by a single bank and ditch the eastern knoll of the site, some 16 acres in extent. Later the enclosed area was extended to embrace the western knoll as well, a total extent of some 45 acres. Finally, the site was brought to its present formidable appearance through the multiplication of its defences and the elaboration of its entrances. In working out such a development an excavator is able to date individual ditches in terms of the pottery recovered from their primary silting ; the sequences of ditches he can sometimes confirm by observing how they intersect ; cross-sections through ramparts will give him the main phases in their construction ; intersections of post-holes and the pottery types contained in them will enable him to evolve the history of the entrances ; and superimposed hut-floors and intersecting store-pits in the interior will help to round off the picture. Thus he will avail himself of such direct stratigraphical evidence as comes to hand, but running like a thread through his whole work is the pottery, which will often allow him to date features never coming into direct contact with one another.

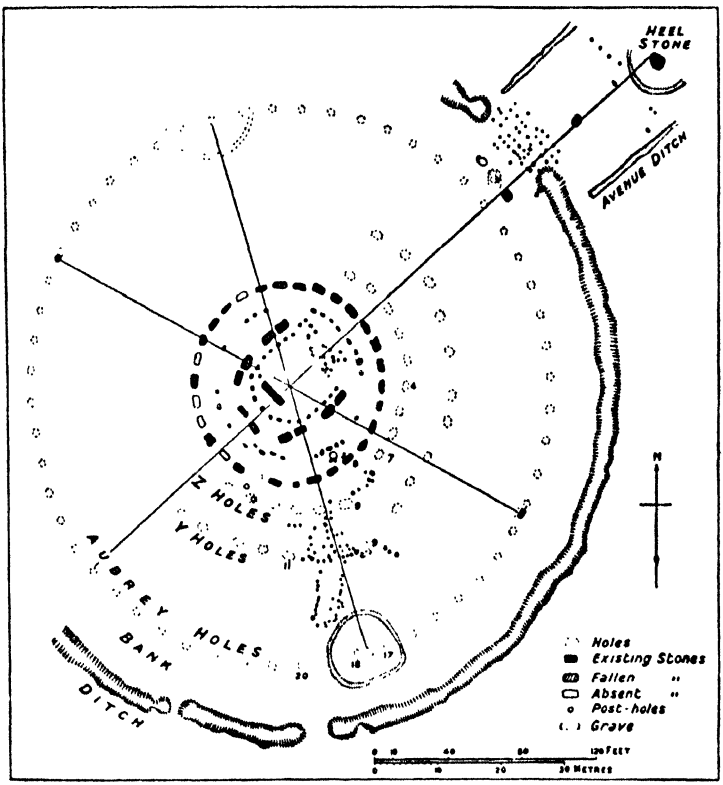
Barrows. In digging barrows the first interments met with will generally prove to belong to a late phase, having been inserted from the surface at a time when the mound had been appropriated as a convenient cemetery. Scores of Late Bronze Age cremations may be a trial indeed to the con-

[1] *Ant. J.*, 1935, 265–75 ; 1936, 265–83 ; 1937, 261–82.

scientious excavator, who though anxious to get to the core of the barrow yet feels obliged to record them with scrupulous care. When he does reach it, he may find it stratified in such a way as to imply two or three phases of construction. Often the original barrow will have been quite a small mound; then, when later burials were made, a thick blanket of soil would be thrown over it to create a more imposing appearance. Where material for the mound was obtained from the ditch, increases in the size of the barrow would lead to the excavation of a new one and the covering of the old. This, together with old surface lines in the material of a barrow, will give the excavator a useful clue when it comes to trying to work out the sequence of burials. When a number of interments are found in the primary part of the barrow it is not always easy to demonstrate their relative ages. The Neolithic Single-Grave barrows of Central Jutland are exceptional in that burials were normally made one above the other. As a rule one has merely to work upon certain probabilities. For instance burials on or below original ground surface are likely to be older than those higher up in the material of the mound, while, among the former, that at the centre is likely to be the oldest. Barrow-digging, like so many other things in life, was very much simpler for our forefathers than for us. For them it was a matter of a few hours' digging to penetrate to the heart of a barrow and extract its richest grave-goods. For us, the excavation of a large round barrow, removing its material down to bed-rock, may involve many weeks of hard work and careful surveying, and cost many hundreds of pounds. The 'loot' obtained by a modern excavator may not notably exceed that of his predecessors, but the success of an excavation should not be measured in terms of material things: scientific excavation is a road to knowledge.

Megalithic tombs. Megalithic tombs should be excavated in light of their use over long periods of time. Occasionally

successive burials will be found stratified, sometimes divided into layers by stone paving, but more often many of the



[*After Kendrick and Hawkes*

FIG. 16

Plan of Stonehenge

earlier ones have been thrown out of the tomb. When this has happened the tip, if located, may provide a useful sequence. Only too often, however, the excavator will find the most

recent burial in good order, the rest in a confused mass ; and even then he cannot be sure how many of the earliest generations have been swept clean away.

Cemeteries. Flat cemeteries of inhumation graves and cremation urn-fields pose much the same problem as do open settlement sites. Occasionally one grave will truncate another, but as a rule it is the horizontal spread of a cemetery that gives the best clues. Once the original core can be located by the occurrence of early grave-goods and the general line of its expansion established by similar means, it is possible to obtain a fair idea of the relative age of individual graves, even when provided with no closely dateable grave goods. But to do this it is necessary to excavate and to plan the entire cemetery.

'*Henges.*' Let me conclude by considering that best-known of all English prehistoric monuments, Stonehenge. Like the cathedrals which in certain respects it resembles, this sacred monument is obviously the product of a long history. An immense, 'learned' and essentially vapid literature enshrines the speculations—and, let it be confessed, the pompous nonsense—to which it has given rise. All that is relevant to us is contained in a few slender excavation reports and summaries.[1]

The problem facing the excavators of Stonehenge has always been how to disentangle the sequence of events that brought the monument to its present form (Fig. 16). This they have solved by studying its plan in conjunction with such stratigraphical evidence as they were able to recover. The results of their labours, together with the chief evidence on which they are based, can be stated in a few words :

(1) The bank, ditch, causeway and 'Aubrey' holes are

[1] *Archaeologia*, LVIII (1902), 37. *Ant. J.*, I, 19 ; II, 36 ; III, 13 ; IV, 30 ; VIII, 149. See also R. S. Newall's invaluable summary in *Antiquity*, 1929, 75.

earlier than any existing stone erections.[1] Not only are they planned from a different centre, but chippings from the dressing of the stones were consistently found above the primary silting of the ditch, and two of the ' stations ' used in planning the stone circles were found to overlie holes of Aubrey's circle.

(2) The sarsen stone circle and horseshoe trilithons, while younger than (1), are earlier than the bluestone erections, since some of the monoliths of the bluestone circle were found to have been set into the filled-up ramps cut to receive sarsen monoliths before being hauled upright.

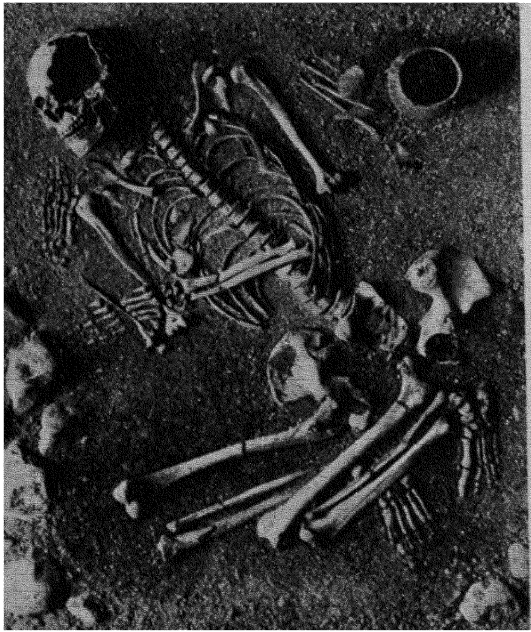
(3) The subsequent date of the bluestone circle and horseshoe is confirmed by their irregular plan, implying the existence of some obstruction.

(4) The X and Y holes, being erected in some instances on the filled-up ramps of sarsen stones, are younger than (2). The presence in them of bluestone chippings suggests that they are younger than (3).

(5) The date of the avenue is uncertain, although, in view of its asymmetry in relation to the causeway, it is presumably younger than (1).

The history of Stonehenge and of its literature reflects the change which scientific excavation is bringing about in our attitude to archaeological problems. Just as the ' mumbo-jumbo ' of medicine-men and leeches has given way to the surgeon's knife, so is false learning being superseded in the field of archaeological research by the humble spade.

[1] I am not here concerned with the absolute date of Stonehenge, but only with the sequence of its existing features. Whether the bluestones were ever set in the Aubrey holes, a question of importance because of the discovery of bluestone chips in early Wiltshire barrows, may never be finally settled.



[*After Forssander*

(*a*) CROUCHED SKELETON OF NEOLITHIC DATE FROM SOUTH SWEDEN

(TEXT, P. 99)

[*After Bursch*

(*b*) EARTH-STAIN SILHOUETTE OF CROUCHED SKELETON OF EARLY BRONZE AGE DATE AT HANERDORF, EMST, HOLLAND

(TEXT, P. 99)

[*After Hatt*

EARLY IRON AGE HOUSE AT SKØRBÆK, JUTLAND, SHOWING WALL-SLOTS, POST-HOLES, AND PAVING

(TEXT, P. 100)

[*After Brøgger*

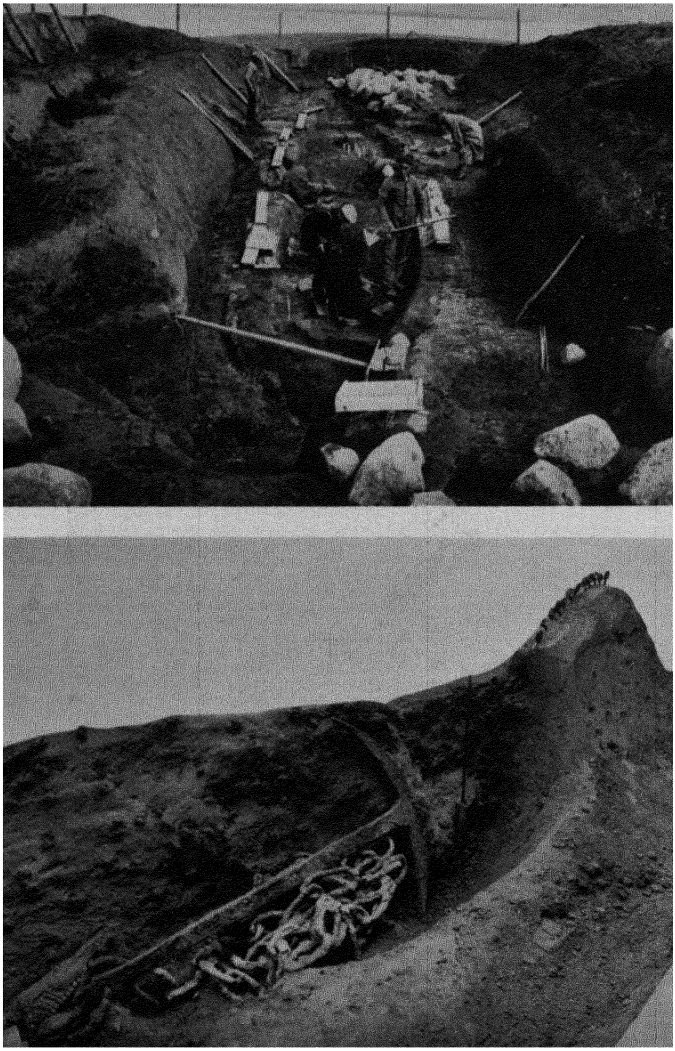
VIKING SHIP AT OSEBERG, NORWAY, DURING EXCAVATION

(TEXT, PP. 91 AND 101)

Note some of the stone packing still in position

(*a*)

(*b*)

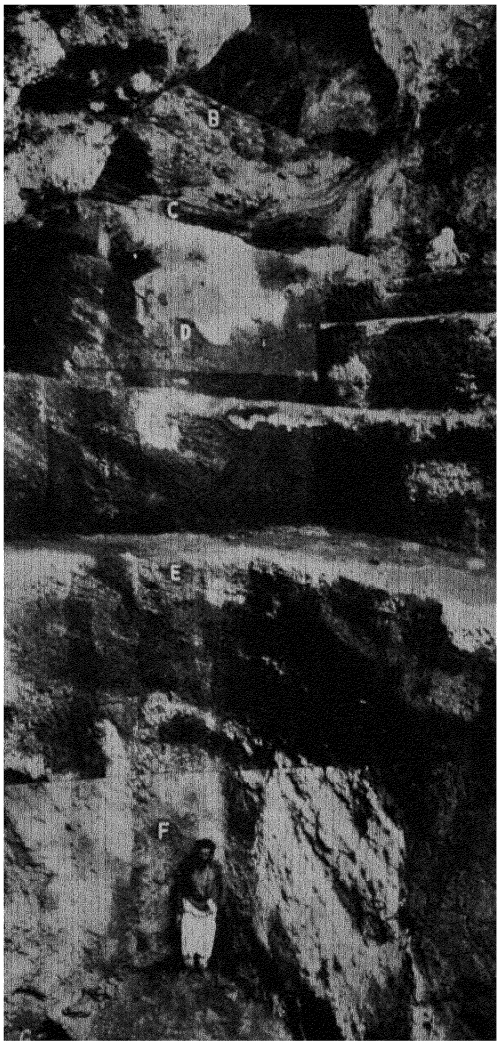


'GHOST' OF VIKING SHIP AT LADBY, DENMARK

(ILN, P. 100)

(*a*) Excavations in progress

(*b*) Prow with iron bolts, iron 'mane' and anchor



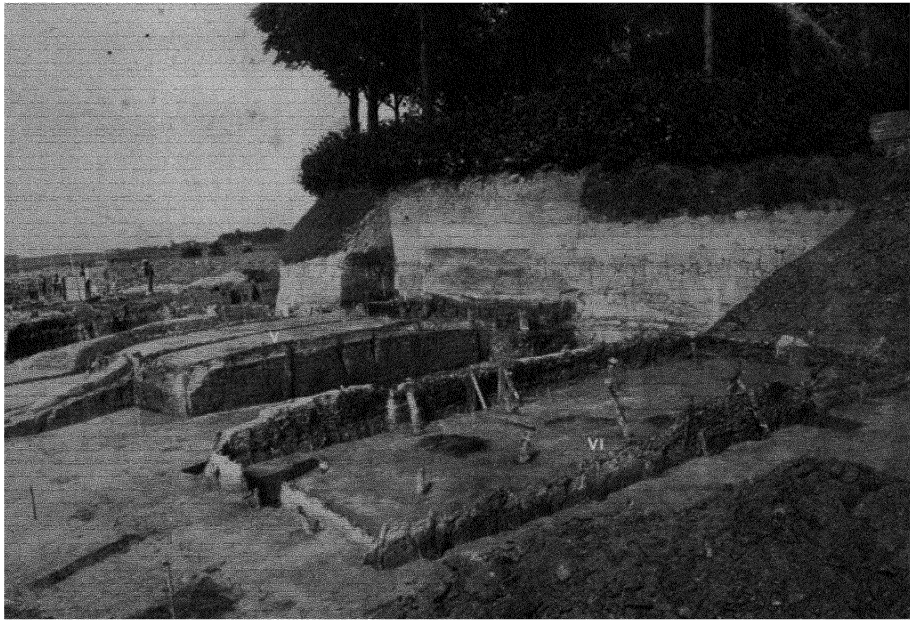
[*After Garrod*

SECTION OF CAVE DEPOSITS AT ET-TABŪN, MT. CARMEL, PALESTINE

(TEXT, P. 102)

B, Upper Levalloiso-Mousterian; *C* and *D*, Lower Levalloiso-Mousterian; *E*, Micoquian; *F*, Upper Acheulian; *G*, Tayacian

AIR-PHOTOGRAPH OF EXCAVATIONS AT UR
A, The Ziggurat, *B*, Cemetery Site, *C*, Pit sunk to pre-Flood level
(HXI, PP. 87 AND 104)



[*After van Giffen*

EXCAVATIONS IN THE 'TERP' AT EZINGE, HOLLAND

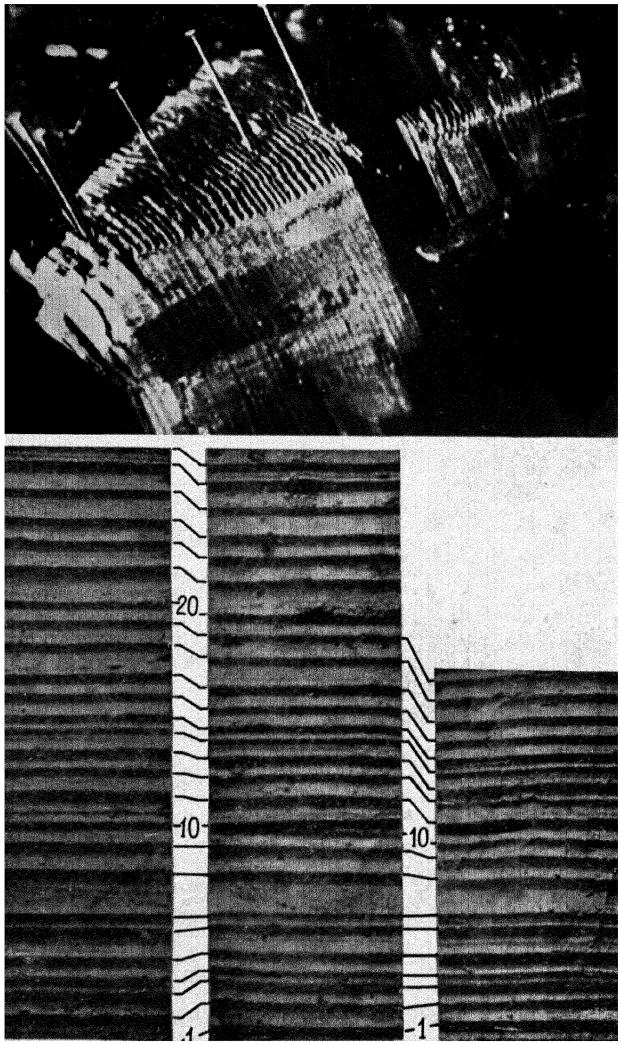
(TEXT, PP. 84 AND 106–7 AND FIG. 15)

Houses of phases V and VI, separated by a low turf mound; in background section through deposits of phases I–IV

PLATE XXIV

(*a*)

(*b*)



[*After Douglass*

(*a*) 3,200-YEAR-OLD TREE GROWTH-RINGS FROM *SEQUOIA* PINE, CALIFORNIA
(TEXT, P. 143)

[*After Sauramo*

(*b*) VARVED CLAY DEPOSITS AT THREE FINNISH SITES
(TEXT, P. 139)

CHAPTER V

CHRONOLOGY

'A great obscurity herein, because no Medall or Emperour's Coyn enclosed.'
SIR THOMAS BROWNE,
Urne-Buriall (1658), Ch. I.

THE attitude of the layman to archaeological chronology is apt to be one of bewilderment. If he asks the date of anything he is either referred to a 'period', an 'age', 'a phase', or to a 'culture', designated by a place-name or even by symbols of esoteric significance: his find is 'Upper Palaeolithic', 'Neolithic', 'Aurignacian', 'Danubian II' or maybe 'Early Iron Age A2'. Really persistent inquiry may elicit a grudging estimate 'accurate within a century or two either way' if it is Neolithic or later, but the tone of the answer will likely as not indicate a low view of the questioner. He may very well end up by suspecting that archaeological labels are mere cloaks for ignorance. In a sense he would be quite right.

Except within certain limits which I shall indicate in the latter part of this chapter, prehistorians have to eschew absolute dates and rely primarily on relative dating. So it is tactless to insist too strongly on a date in years for your find.

Then the designations which mystify any one new to archaeology are not intended to be more than labels. The age or period labels, like Palaeolithic, Mesolithic, Neolithic, Bronze Age and Early Iron Age, serve to divide up the prehistory of any region into chapters. The culture terms are meant to distinguish the different groups which flourished, often several at a time, during a given period. As a rule a

culture is named after the site where it was first found or where it is well represented, often a place which to-day is obscure. Sometimes it happens that the increase of knowledge renders the material from the name-site of a culture no longer really typical of the culture as a whole. This has caused some people to prefer to label cultures by capital letters A, B, C, &c., sometimes distinguishing temporal phases by the addition of small numerals. In my opinion the cure is worse than the disease; if carried to its logical conclusion it would turn archaeological terminology into an algebraical exercise. Place-names are not always satisfactory, but at least they evoke some associations as well as having the merit of a greater range of variation.

That prehistorians have to depend to so large an extent upon relative chronology is certainly a drawback, though not by any means so serious as might at first appear. We become so used in ordinary life to using exact dates that there is some possibility of forgetting that their only purpose is to allow us to arrange events in due order. Fundamentally the difference between relative and absolute dates is less one of kind than of degree, of the degree of attainable precision. Obviously by using dates of years, months and days it is possible to define events far more precisely than when one has to rely upon the cruder scale afforded by cultural or industrial changes. But the fineness of the scale should have reference to what it is proposed to measure. A month or even a year, while of the highest potential importance to students of modern history, has no more relevance to the dating of a Lower Palaeolithic culture than a centimetre has to the measurement of Everest. Nevertheless there is every reason to think that prehistory would gain immensely in definition if its chronological apparatus was more precise.

RELATIVE CHRONOLOGY

Typology. The fact that industrial and art forms are subject to evolutionary processes is a great aid when it comes to arranging them in sequence. Sometimes, as in the case of the metal axe of the European Bronze Age, evolution proceeds along the line of functional and technical improvement: hammering of the cutting edge to toughen it will produce a

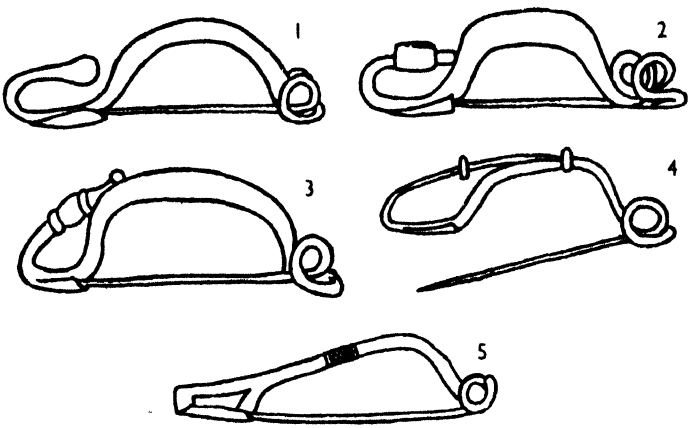


FIG. 17

Development of La Tène fibulae (safety pins) in Britain

splay; flanges, first hammered up and then cast, will help it to hold more firmly to its handle; the stop-ridge will assist further in the same direction and by its development will ultimately give rise to the plastave, soon to receive a loop. Here the succession of forms is more or less conditioned by considerations of efficiency. In many instances, however, there appears to be little or no practical value in the changes which occur. Take for instance the La Tène (Early Iron

Age) fibula in England, the typological development of which is mainly expressed in the behaviour of the foot: from standing clear of the bow (Fig. 17, no. 1), it approaches closely (no. 2), aligns itself upon it (no. 3), joins it (no. 4) and ultimately becomes structurally part of it (no. 5).

In applying typology to dating it is very important to bear in mind that, as in the biological world, primitive forms have

[*After John Evans*

FIG. 18

British coins: degeneration series

Note. The prototype, the *stater* of Philip II of Macedon, is shown, obverse and reverse, at the left of each row

a tendency to survive alongside more evolved ones. This means that no great reliance can be placed upon the typological dating of single objects. Further, when it comes to groups of objects of the same age, the governing factor should always be the typologically youngest forms [1]; this sounds sufficiently obvious, but many of the most serious blunders in archaeology

[1] There are occasions when the 'earliest' forms may be relevant. For instance, they may give a clue to an early stage in the use of a megalithic tomb. In this case, however, we are dealing with a mixture from different periods.

have arisen through the dating of finds in terms of their most archaic elements.

Typological development frequently takes the form of degeneration. One of the best instances of this is afforded by the earliest native coinage of Gaul and Britain. The derivation of a whole series of native coins from the *stater* of Philip II of Macedon was first advanced by Sir John Evans in his lecture on the 'Evolution of British Coins from Philippi' delivered to the Numismatic Society as long ago as 1849 and later elaborated in his standard work on *Ancient British Coins*. As the original design lost its significance it tended to break up into its component parts: at first the laureate head of Philip was fairly faithfully reproduced, but as it resolved itself into mere identification marks the native designers seized on certain elements such as the garland and the fringe of curls on the forehead, the actual face soon disappearing completely (Fig. 18, nos. 1–5). The charioteer on the reverse, originally shown with wings, was early reduced to a blob; his chariot survived as a wheel, at first provided with spokes but soon rendered by a single dot, while his steeds were instantly reduced to a single creature which gradually disintegrated into four elongated strokes and a number of irregular blobs (nos. 6–10). Such a degeneration series as this provided Evans with a basis for his relative chronology of native coins. Describing his own work he wrote: 'I attempted to apply the principles of "evolution" and "natural selection" to numismatic inquiries; and when, ten years afterwards, Darwin's great work on the origin of species was published, I found that I had been approaching the study of barbaric art on much the same lines.'

It is not always an easy matter when confronted with a typological series to determine the direction in which development has proceeded, to determine in other words whether one is dealing with progressive evolution or with a series of degeneration. Indeed some of the greatest archaeological

controversies have hinged on this very point. Foremost among these is the relative dating of megalithic tombs in prehistoric Europe. Broadly speaking the 'classical' theory assumed that the simplest form, a small closed chamber or dolmen, was the earliest, and that from this elementary stage there grew up, through chambers with incipient passages, great passage-graves, and ultimately, in such cemeteries as Los Millares and Palmella, corbelled vaults or cupola and rock-cut tombs. Advocates of this school were not only able to point to an apparent elaboration of tomb-structure but also to a parallel increase in the wealth of grave-goods. Both the tombs and their contents seemed to them to speak of progressive development. Modern opinion, however, is almost unanimous in reversing the sequence, accepting as earliest the rock-cut tombs and the more magnificent passage-graves with their rich and often exotic grave furniture and treating as degenerate the dolmens and intermediate forms. So far as south-western Europe and the British Isles are concerned, indeed, the degeneration theory has by now become orthodox. That it should be possible for opinion to change so radically makes it all the more essential to check evolutionary sequences where possible by alternative methods of dating.

Find-complexes. Typological development carries more weight when supported by the evidence of associated finds. When certain forms at analogous stages of evolution are consistently found together, and when more evolved stages of these forms are likewise found consistently in association, the reliability of any sequence based on a theoretical line of evolutionary development is sensibly increased.

The chronology of the European Bronze Age has been built up almost entirely on a study of associated finds or hoards. Hoards of course differ greatly in their chronological value. Objects found in hoards which represent the equipment of an individual, whether buried for safety during life-

time or placed with him as grave-goods for use in the next world, are likely to have been in contemporary use, although allowance must be made for heirlooms. Merchants' hoards, the stock-in-trade of travelling salesmen, can certainly be taken as comprising objects of the same age. Votive hoards vary in value: where only a few objects deposited at one time are in question, they can be regarded as contemporary, but where it is a case of temple offerings, representing the accumulations it may be of generations, many periods may be represented. Founders' hoards, which throughout Europe are particularly common from the Late Bronze Age, comprise essentially scrap-metal and are therefore likely to include objects of widely varying dates. It is thus important to decide from its composition and nature of occurrence what is the true status of an associated group of objects before using it for chronological purposes.

Once the skeleton of metal types has been built up for any period, it is possible by relating to it other aspects of culture, for instance pottery, house-types and burial rites, to distinguish the cultures through which a region has passed on a somewhat broader basis. Thus in Britain any find or site associated with, say, a bronze rapier can be referred with strong likelihood to the Middle Bronze Age, while anything associated with objects comprised in the 'carp's tongue sword complex' can safely be dated fairly late in the Late Bronze Age. Once the material available for any period has been arranged in chronological sequence it is possible to interpret the various changes in terms of indigenous development, diffusion by trade or ethnic movements; in fact, it is only when the evidence has been tabulated in order, that it is feasible to begin to consider what it means. At present prehistoric archaeology, even in the well-explored parts of the world like western Europe, is only painfully extricating itself from the stage of collecting and too often of salvaging its basic texts;

nevertheless, as I shall show in Chapter VI, the time is coming when more attention must be paid to matters of interpretation, if only to give direction to the search for evidence.

Stratigraphy and sequence. The final test of a sequence built up on studies of typological development and find-complexes is stratigraphy, taken in conjunction, as I shall illustrate in the next section, with a comprehension of the factor of geographical distribution. For a period like the Bronze Age stratigraphical evidence, although it is available in successive interments and material from ditch siltings and the like, is relatively rare outside the tells of the middle Danube area, being hardly adequate to check the evidence of association.

For the earlier periods of prehistory, however, when cultures were generally more long-lived, stratigraphy assumes the leading rôle among dating methods. In areas where caves were available and for periods during which they were frequented, it is usually possible to obtain a fairly complete sequence without much difficulty, although it seldom happens that any one cave gives so complete a sequence as Castillo (p. 102). Still, by digging two caves in Mount Carmel Miss Garrod was able to establish with some approach to finality the Stone Age sequence of Palestine from the Tayacian to the Natufian as follows :

et-Tabūn (pl. XXI)		*Mugharet el-Wad*
		Upper Natufian
		Lower Natufian
		Atlitian
		Middle Aurignacian
		Lower Aurignacian
Upper Levalloiso-Mousterian	⟷	Upper Levalloiso-Mousterian
Lower Levalloiso-Mousterian		
Upper Acheulian (Micoquian)		
Upper Acheulian		
Tayacian		

As Miss Garrod has herself written[1]: 'the result is that the general outline of the Stone Age chronology of this region from the Tayacian onwards is now solidly established, and it is unlikely that future discoveries will lead to any substantial modification of this framework'. On the other hand, the excavation of caves where certain phases happen to be particularly well represented will certainly help to fill out the picture. Already since her book was written Father Dogherty's work at the Ksar Akil, Antelias, near Beirut, has disclosed a Lower Aurignacian very much better developed than any yet found in the Carmel caves. Further, to complete the sequence it will be necessary to correlate Miss Garrod's results with discoveries of earlier Palaeolithic cultures in Pleistocene deposits other than those in caves.

Where caves are not available and for periods during which they were not frequented, the task of building up a succession is primarily geological, and as a rule calls for the investigation of a far larger number of sites. It is a question of locating flint industries in geological deposits, discounting their derivation from older deposits and arranging them in their proper sequence, a task which can only be accomplished by intimate co-operation between archaeologist and geologist. For the Pleistocene period as a whole the waxing and waning of ice-sheets and the alternation of pluvial and inter-pluvial phases provide the most important evidence for its sub-division.

Wherever systematic researches have been made, both in Europe and North America, a sequence of glaciations has been recognized, recalling Albrecht Penck's original series in the Alps, named successively Günz, Mindel, Riss and Würm after some of his key sites. Often the Alpine terminology is applied to other parts of Europe, but when we speak of the Riss-Würm inter-glacial in East Anglia we really only refer

[1] D. A. E. Garrod, *The Stone Age of Mount Carmel*, I, 114. Oxford, 1937.

to the inter-glacial which we assume to be equivalent to this inter-glacial in the Alps. Perhaps, until the synchronisms are absolutely established, it is better to employ regional terminologies. However this may be, if we reckon with four glacial and three inter-glacial stages Pleistocene time is already divided into seven compartments; by correlating human industries with geological deposits referable to one or other of these stages it is possible to fix the chronological span of the several Palaeolithic cultures found in the area investigated. But this is only a beginning. Already by working in peri-glacial zones on the fringe of the old ice-sheets it is possible to distinguish a whole series of minor oscillations within each of the major stages of glacial advance or retreat. By recovering artefacts from the loesses and solifluxion deposits which denote these changes it should ultimately be possible to perfect a very much finer chronology.

For parts of the world outside the direct effects of glaciation evidence is frequently found of prolonged periods of extra rainfall interrupted by periods of relative dryness. Such pluvial and inter-pluvial phases provide sub-divisions of Pleistocene time comparable with those afforded by glacial and inter-glacial episodes, although unfortunately less numerous. Recent work in North and East Africa, Palestine and Malabar has only disclosed two major pluvials, followed by minor wet phases reminiscent of the minor glacial oscillations in Late Glacial and Post-Glacial Europe. This has led some scientists, notably G. C. Simpson and his followers,[1] to suggest that each pluvial is the equivalent of two glacials and an inter-glacial, but it must be confessed that there is as yet no general agreement on the valid correlation of the two sequences.

Animal and plant life have each reflected to some extent the great climatic oscillations which characterized the Pleisto-

[1] G. C. Simpson, 'World Climate during the Quaternary Period' *Q. J. Roy. Meteorol. Soc.*, 1934, p. 425.

cene period in every part of the world. Although certain species, notably carnivores, showed great powers of adaptation, in regions subject to glaciation or its effects warm- and cold-loving species tended to replace one another, while in pluviated regions forest and desert species tended to alternate, as exemplified in the deer and gazelles of the Mount Carmel caves. Further, certain species, in particular various types of elephant, became extinct in the course of the evolutionary process at different stages of the Pleistocene. For these reasons it is always important to collect all animal remains from implementiferous deposits and have them identified by a competent palaeontologist.

Plant life is on the whole more sensitive to changes than fauna and its fluctuations are capable of giving finer chronological indications. It is therefore unfortunate that the record for Pleistocene time as a whole is very incomplete; discoveries like the breccia at Hötting near Innsbruck, dating from the Riss-Würm inter-glacial and containing rhododendrons and other species living to-day in areas with an average annual temperature 2° C. higher, only serve to indicate the sort of evidence we have mostly lost.

For post-glacial times, however, a remarkably complete record of forest history has been preserved in the bogs of the temperate regions. Here in unaerated and particularly in water-logged deposits are preserved not only the remains of trees, their leaves and fruits, but also the membranes of their microscopic pollen-grains. Since these pollen grains have been blown into the growing bog from a broad belt of country they tell us of the composition of forests in the whole region, unlike the macroscopic remains which reflect the vegetation of their immediate neighbourhood. Pollen-analyses of samples taken throughout deposits filling up old lake-beds thus allow us to trace fluctuations in forest history throughout the period represented by their formation. By correlating

sections it is possible to obtain a complete record of forest history from the retreat of the ice-sheets to the present day. The various phases through which the development of forests passed during this period afford a ready means of zoning it; in other words pollen-analysis is capable of providing a natural time-scale against which archaeological events can be measured.

Naturally the results apply with exactitude only to quite narrowly defined provinces, and one of the first tasks of the palaeo-botanist is to define these for the country in which he is working. On the other hand once the provinces are defined and sequences established for each, it is usually not a difficult matter to synchronize them. At present it is only for the countries contiguous to the original centre of pollen-analysis that we have an accurate knowledge of forest history. Even in Sweden the method is less than a quarter of a century old, but already it has been applied intensively in the other Scandinavian countries, Russia, North Germany and parts of Central Europe. In the Irish Free State, thanks to the Danish mission, a general scheme has been completed, but in Great Britain it is only locally that even the general outlines have been established, the Cambridgeshire Fens being the first area to be intensively studied.[1] The fact that forest history differed substantially, especially in its later stages, in different parts of north-western Europe makes the interpretation of results a matter for the expert. Nevertheless, certain broad results can be stated in general terms. For instance, during the time that north-western Europe was occupied by the food-gathering Mesolithic people its forests everywhere underwent the same general development. Three main phases can be distinguished:

(i) A period during which the forests were composed exclusively of cold-loving trees, birch, pine and willow.

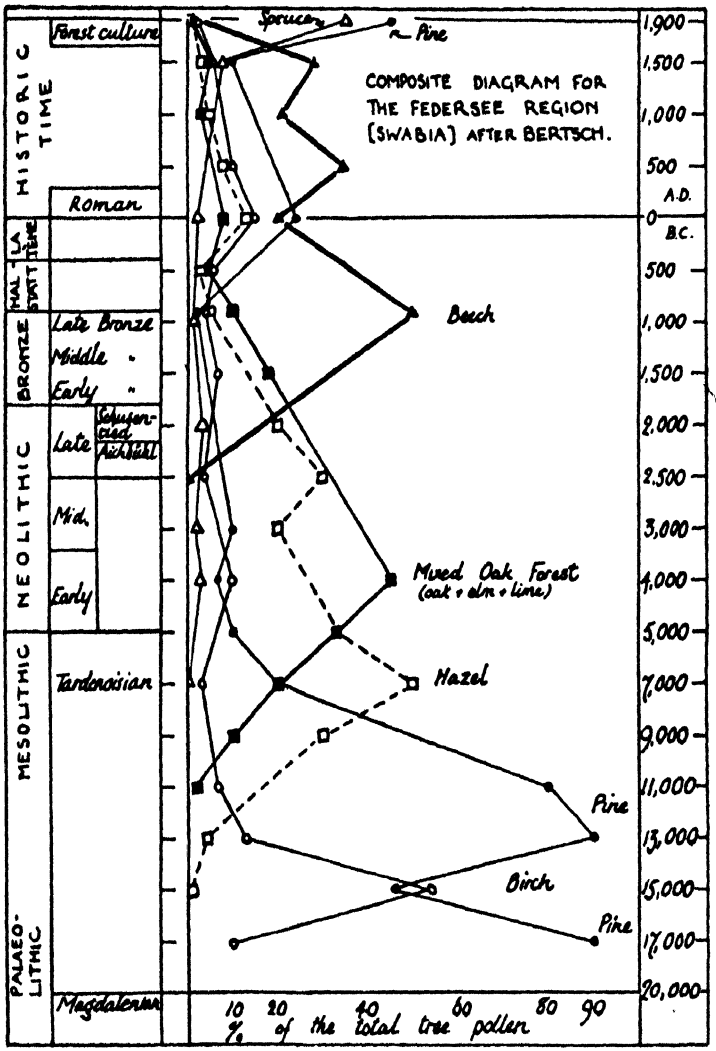
[1] For the method, see H. Godwin, *New Phytologist*, XXXIII (1934). For the Cambridgeshire results, see H. Godwin and M. H. Clifford, *Phil. Trans. Roy. Soc.* Ser. B. No. 562, Vol. 229, pp. 323–406.

(ii) A period during which such warmth-loving trees as the oak, elm, lime and alder, together with the hazel, made their way in, at first rather tentatively.
(iii) A period during which the warmth-loving trees climbed to predominance among the forests and the cold-loving trees sank into insignificance.

The phases so defined are generally known respectively as Pre-boreal, Boreal and Atlantic, and it is these terms (derived from the palaeo-climatic researches of Blytt and Sernander) which have been habitually used when referring to specific stages of early post-glacial time. During the subsequent Sub-boreal and Sub-atlantic stages forest history is complicated by the arrival of different trees in the various parts of north-western Europe, so that apart from the effects of the climatic deterioration of the latter stage there are no definite trends common to the whole area. The present tendency is to drop the terminology based on Blytt and Sernander's work, which no longer claims general assent, and to number the phases. Northern workers distinguish twelve, three late glacial and nine post-glacial, but unfortunately, whereas the Swedes number theirs from I to XII downwards, the Danes prefer to start from the bottom upwards.

One of the localities where correlations between the archaeological and palaeo-botanical sequences have been made most successfully is the Federsee in Württemberg, a lake which ever since the melting of the ice-sheets has tended to shrink.[1] Along the successive shore-lines of the dying lake early man was wont to build his houses. By recovering his rubbish discarded in the old lake deposits and noting the stratigraphical position of his houses, it has been possible so to relate each archaeological period to its contemporary phase of forest

[1] K. Bertsch, *XVIII Bericht d. Röm.-German. Komm. d. Deutschen Archäolog. Inst.* (1928).



[After Godwin

FIG. 19

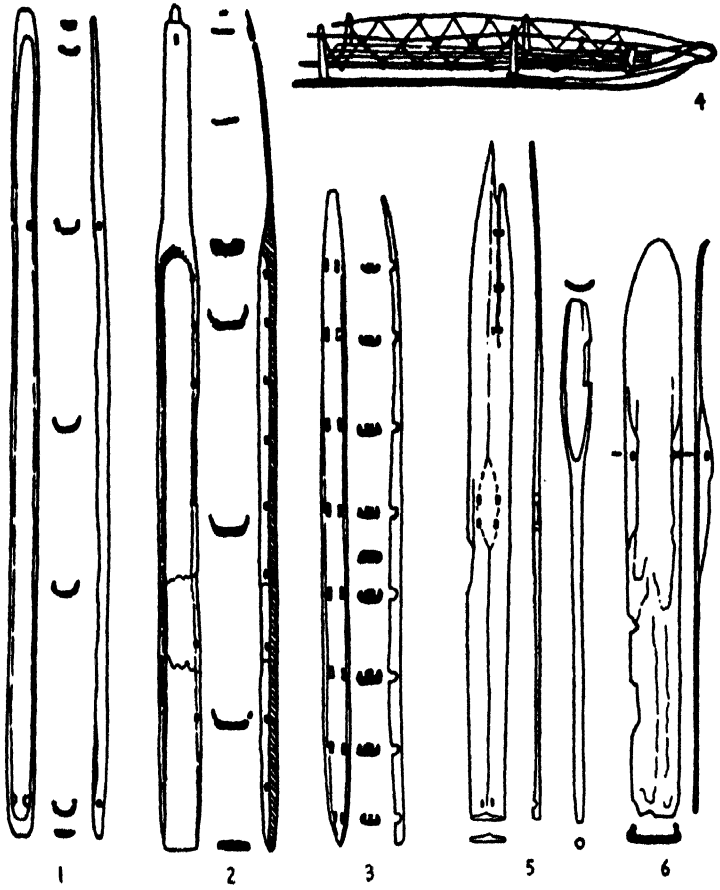
Composite pollen diagram for the Federsee region, Württemberg

history as to make the two virtually interchangeable (Fig. 19). Thus, when a wooden causeway or some other feature not directly datable in terms of archaeology is found, it is possible by observing its forest-history context to arrive indirectly at its archaeological age.

In Finland and Sweden, where pollen-analysis is so far advanced that in some areas the peat-bogs have been zoned to intervals of something like a century, it has been successfully applied to the dating of wooden sledge-runners and skis.[1] With such exceptions as the Oseberg ship provides, the conditions for the survival of such winter-travelling appliances on archaeological sites are generally unfavourable. Indeed, it is only specimens lost or discarded in bogs or old lake-beds that have much chance of being preserved ; and such specimens, unless they happen to be carved in a recognizable style, can hardly be dated on purely archaeological grounds. On the other hand, their finding-places are generally ideal for dating by pollen-analysis. Successful efforts have been made in both countries during recent years to see that casual finds of such objects are followed up, their finding-places visited and samples taken from the proper levels. Already sufficient specimens have been dated in this way to clarify the development of winter travelling appliances from Mesolithic times to the present day (Fig. 20).

Yet another means of zoning time is afforded by the changes of level between land and sea, which are proclaimed in so

[1] An early paper was that by Prof. U. T. Sirelius, 'Zur Geschichte des prähistorischen Schlittens', *P. W. Schmidt Festschrift*, 949–53. Vienna, 1928. Great progress has been made during the last ten years. Thus, in Finland some 76 skis and 45 sledge-runners and keel-planks had been recorded up to 1938 : see T. I. Itkonen in successive issues of *Suomen Museo* from vol. I (1930) onwards. For the Swedish material a monograph is shortly expected from the *Föreningens för skilöpningens främjande i Sverige*. Meanwhile, see G. Berg, 'Förhistoriska skidor i Sverige', *På skidor*, 1933, 160.



[*After Berg, Itkonen and Sirelius*

FIG. 20

Skis (nos. 5 and 6) and sledge-runners (nos. 1–3) from Scandinavian bogs

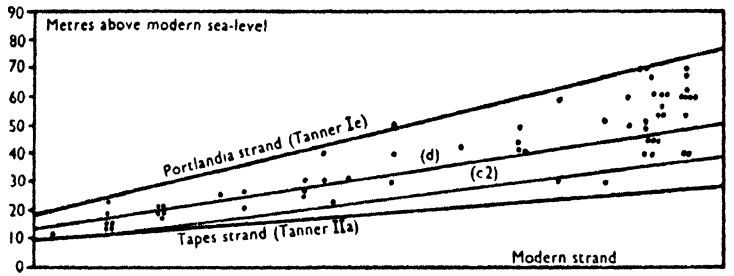
No. 1. From Meinola, Finland. Mesolithic (Ancylus Lake Age)
No. 2. From Saarijärvi, Finland. Mesolithic (Early Litorina Sea Age)
No. 3. From Sodankylä, Finland
No. 4. Reconstruction of dog sledge (Sirelius)
No. 5. Ski runner and stick from Västerbotten, Sweden. Late Neolithic
No. 6. From Rühimäki, Finland. Late Neolithic

many parts of the world by old beaches and strand-lines raised above modern sea-level and conversely by tracts of submerged land vegetation. Work is at the present moment going forward actively on the changes of level in the Mediterranean basin during Palaeolithic times, but it is only for post-glacial time in northern Europe that precise and more or less complete information is available. Scandinavian archaeologists have succeeded so well in elucidating the geographical evolution both of the Baltic basin and of the ocean coasts of their peninsula that the relation of archaeological sites to old strand-lines has become a primary factor in their dating. For ready reference the strand-lines are usually named after some shell-fish of leading importance found in them. The following table synchronizing the phases of the Baltic with the sequence of strand-lines on the oceanic coasts may be found useful when reading works on Scandinavian archaeology :

Oceanic phases (*Øyen*)	Baltic phases (*Munthe*)
Mya, Ostrea	Baltic Sea
Trivia, Tapes	Litorina Sea
Mactra, Pholas, Litorina	Ancylus Lake
Portlandia	Yoldia Sea
Mytilus	Baltic Ice-dammed Lake

The task of correlating archaeological sites with the sequences so established varies in difficulty very widely : in parts of Denmark and South Sweden where sea-level has oscillated, now rising and now falling, it may be an intricate matter upon which it is often difficult to arrive at any very certain conclusions; in areas nearer the centre of the old ice-sheet, however, where

during the greater part of post-glacial time the land has gained fairly consistently on the sea, the problem is more straightforward. For instance, the earliest dwelling-places of Finland, which were inhabited by Mesolithic or Sub-mesolithic food-gatherers with a proclivity for coastal settlement, can be graded according to their relationship to old strand-lines, the older sites being at high, the younger sites at low levels. The sequence of five groups distinguished by Europaeus in Finland



[*Based on Tanner*

FIG. 21

The relation of Finnmarkian sites (marked by dots) to ancient strand-lines in northern Norway

by this method is supported also by the development of decoration found on the pottery.

When dating sites by such means in Norway the mistake has sometimes been made of basing results on their heights above modern sea-level. Yet even in a single fjord the difference in level of the same strand-line may be considerable. It is therefore essential to date prehistoric sites directly in terms of their relationship to ancient sea-levels, the strands of which will be found to slope upwards towards the centre of isostatic displacement and recovery (Fig. 21). Further, it must be remembered that, unless a site can be proved to have been situated on its contemporary shore-line, it is only possible in

a region where sea-level has consistently fallen to arrive at its maximum, not at its actual date.

A final point of general importance to bear in mind when employing natural methods of relative chronology is that the best results are likely to be obtained through the convergence of two or more lines of evidence. Thus, where typological evidence is supported by a purely geological determination of the sequence of deposits, the succession is much more likely to be sound than if it rested on typology alone; where, in addition, the stratigraphy is supported by independent study of animal and plant remains it is likely to be as certain as such matters can well be.

Geographical distribution. Cultures have length and breadth as well as depth: fully to understand them it is essential to think of them as occupying space as well as time. This is a truism to-day, but it has become one only quite recently. Time was, not very long ago, when archaeologists were so preoccupied with the primary task of elucidating the stratigraphy of their own particular regions, that they tended to forget that cultures were essentially the product of human groups occupying defined geographical areas. The change of outlook can be followed by observing the gradual and retarded appearance of the distribution map in archaeological literature.

The first loose finds to be mapped appear to have been coins. J. Y. Akerman published a map of inscribed British coins, distinguishing varieties by different symbols, as long ago as 1849, a pioneer effort followed up in 1890 by Sir John Evans. But these maps were essentially devised to illustrate political divisions: they were really maps of inscriptions rather than of artefacts. Distribution maps of objects as such do not appear until the last decade of the nineteenth century, when Heierli and Oechsli issued maps of Swiss cantons showing antiquities of the Stone, Bronze and Iron Ages in different

colours. In England they appeared during the early years of the twentieth century in the archaeological chapters of successive *Victoria County Histories*. Crawford's paper to the Royal Geographical Society in 1912 on the flat axe of the Early Bronze Age was something of a landmark, since he used distributions as arguments in questions of date and cultural affiliation. Since the war Sir Cyril Fox and many others have helped to make distribution maps an integral feature of archaeological publications.

Naturally the importance of geographical distribution varies according to the size of the area under consideration and to some extent also the culture studied. Yet even for Palaeolithic cultures, which often lasted a long time and extended over wide areas, it is essential for anything beyond a local study to keep the broad question of geographical distribution well in mind. This was forcibly borne in upon archaeologists when the results of excavations in Africa, Palestine, India, Russia, Siberia and China began to flow into western Europe. The facts as revealed could no longer be made to fit the 'classical' sequence. It became obvious, for instance, that the Upper Palaeolithic sequence of the French caves was of purely regional validity. That even in Lower Palaeolithic times cultures had geographically limited spreads was evident simply by comparing the core industries west of the Rhine with the flake industries to the east: when it became possible to contrast the results of research in Africa and Asia, south of its mountain divide, with those obtained in Asia north of the Himalaya, the distinction was seen to be one of world-wide significance.

As for the younger cultures, which tend to be of shorter duration, and in proportion as settled life was achieved, to be more narrowly regional, their study would be quite meaningless without a full understanding of the factor of geographical distribution. Ideally we should be able to map them at short intervals, say of half a century. The picture that would emerge

would be a highly complex one of cultures coming into being, spreading, developing very often as they move, coming into contact with others, sometimes hybridizing, and sometimes maintaining independent although closely interlocked existences.

Synchronisms. In trying to assess the chronological relationships of two or more cultures, the evidence of geographical distribution will often give indications, which when other evidence is lacking, may have their value. For instance where the distributions of cultures are mutually exclusive there is some presumptive evidence for their contemporaneity; where on the other hand their distributions overlap they are likely to differ in age. In the case of individual material culture forms, where the distribution of two or more are found to coincide closely, this argues in favour of their belonging to the same culture. If the distribution of the crescentic jet necklaces and gold 'lunula' ornaments of Bronze Age Britain are plotted on the map they will be found to coincide closely with the distribution of food-vessels; this has been interpreted as supporting the view that the lunulae are modelled on the jet necklace, as indeed their ornamentation suggests; it further helps to attach the lunulae to the food-vessel culture with which the jet necklaces have long been connected on account of their association in grave finds. In such a manner can clues based on typology, find-complexes and geographical distribution combine to point to the same conclusions.

The dating of trade routes has also been greatly advanced by distributional studies, among them the prehistoric amber routes between Jutland and East Prussia and Greece originally built up by plotting on a map closed finds of different archaeological periods containing northern amber.[1] It was along the amber routes that Central European and North Italian metal

[1] J. M. de Navarro, *Geogr. J.*, 1925, 486 ff.

types first found their way to Denmark. Such trade routes indeed provide some of the best evidence for synchronisms.

A favourite method of synchronizing developments in neighbouring areas is to compare any stratigraphical sequences which exist near the line of junction and see what features are in common For instance, to synchronize the Neolithic cultures of France and Bohemia one looks to the sequences established by Vögt in the eastern lakes of Switzerland and by Bersu on the Goldberg, a strong site in Württemberg, to bridge the gap :

France	*Swiss Lakes (Eastern)*	*Goldberg*	*Bohemia*
	Corded ware		
			Danubian III
Seine-Oise-Marne ⟷	Horgen		
	Michelsberg ⟷	Michelsberg	
		Aichbühl	Danubian II
Primitive 'Western'			
(e.g. Grotte de Bize)	Cortaillod		Danubian I

In the above table it is evident that the sequence on the Goldberg suffices to synchronize the Swiss cultures with those of Bohemia, since the Michelsberg culture is common to the two former series, while the Aichbühl culture of Württemberg is simply a local variant of Danubian II. From this it follows that there must at least be some chronological overlap between the underlying Cortaillod culture of Switzerland and the Danubian I of Bohemia and neighbouring regions. But the Cortaillod culture is also found at the bottom of the lake-village sequence in western Switzerland and the Jura, as well as farther afield in France, where it occurs in the lowest Neolithic levels in caves (e.g. Grotte de Bize, Aude) and hill-forts (e.g. Camp de Chassey, Saône et Loire. So we can peg one stage of the French Neolithic into the Central European sequence : Chassey I at least overlaps with Danubian I, although we have as yet no certain means of determining the extent of the over-

lap. A second indication is given by the fact that the Seine-Oise-Marne culture must equate fairly closely to the Horgen culture of the Swiss sequence, the pottery and many material

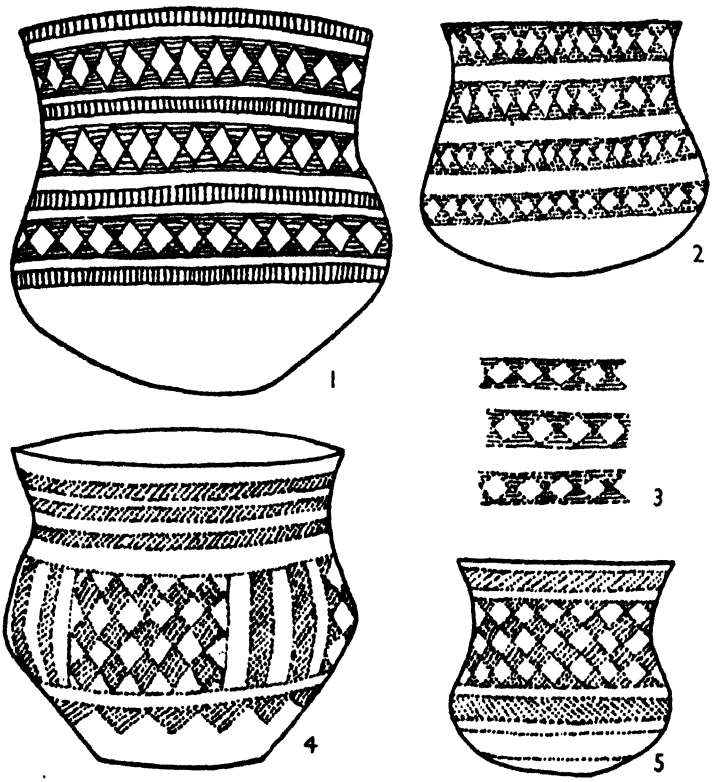


FIG. 22

Bell-beakers from Denmark (Nos. 1, 4), Bohemia (No. 5), Sardinia (No. 2) and Spain (No. 3)

culture types being common to the two. But the Horgen being younger than the Michelsberg and the Michelsberg overlying the Aichbühl culture on the Goldberg, it is evident

that the Seine-Oise-Marne culture must be younger than at least the main duration of Danubian II; in fact it is likely to overlap with the Danubian III phase of the Danube area. This is confirmed by the fact that bell-beakers entered Bohemia at this time, and in the Rhineland came into contact with corded ware, which in the Swiss sequence immediately overlies Horgen pottery.

Let me as a final example quote the spread of the bell-beakers, an easily recognizable type of pottery, which, because of the rapidity and extent of its diffusion, provides our best datum for synchronizing the closing stages of the Neolithic in different parts of Europe. Consider the two bell-beakers found in Danish passage-graves. The reserved lozenges defined by horizontal shading of the Zealand specimen (Fig. 22, no. 1) can be matched closely on pots from a megalithic tomb in Spain (no. 3) and from a rock-cut tomb in Sardinia (no. 2). On the other hand, the oblique shading throwing into relief reserved lozenges seen on the Jutish beaker (no. 4) is best paralleled on a pot from Bohemia (no. 5). Going farther afield it would be easy to find close parallels, also, between beakers from Bohemia and Iberia and North-West Sicily, parts of France, the Rhineland, the Low Countries and Britain. Over this vast area of diffusion from South Spain to Poland, from Orkney and Jutland to Sicily, the bell-beaker (and in part the hybrid zoned-beaker) runs like a thread drawing together the diverse cultures which flourished during the nineteenth and twentieth centuries B.C. in western, central and northern Europe.

ABSOLUTE CHRONOLOGY

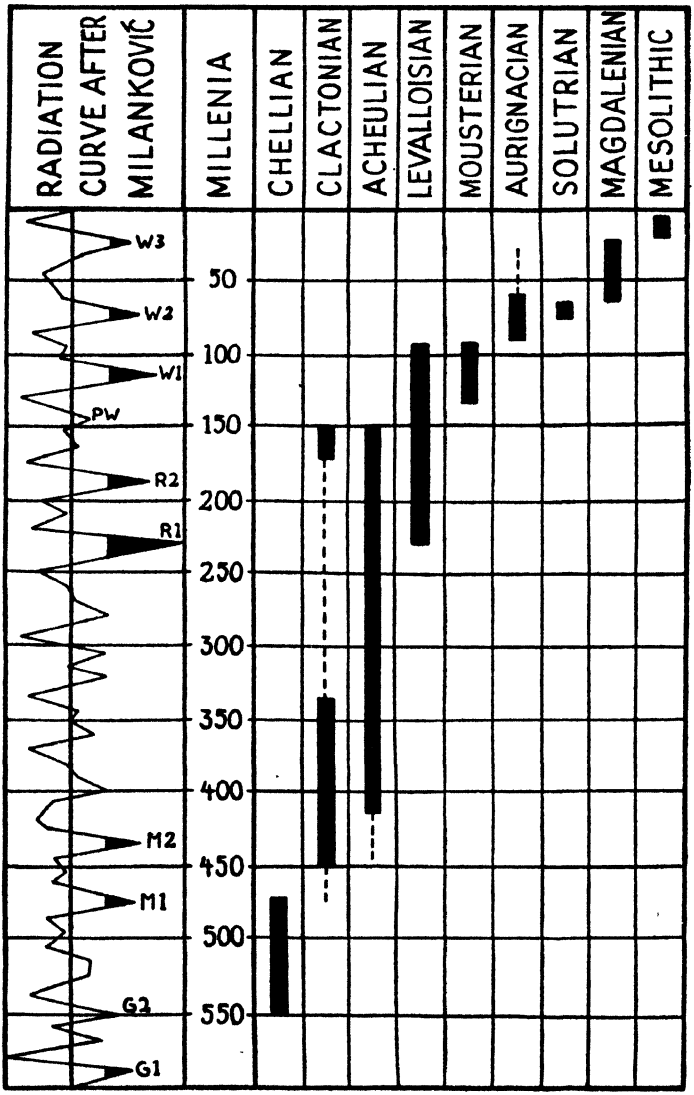
Geochronology. The magnitude of the physical changes since the appearance of man is sufficient evidence of his antiquity. Is there any means of assigning absolute dates to

these events and so expressing in terms of years the age of his earliest cultures? Some people think it possible by correlating astronomical with geological results to establish a geochronological system for the whole Pleistocene epoch.

By examining areas marginal to the ice-sheet, the famous German quaternary geologist W. Soergel found that the glacial sequence was considerably more complex than had previously been thought. Each of the first three glaciations he has shown to be double and the fourth (Würm) triple, so giving nine major glacial maxima, not to speak of minor episodes. Quite independently the astronomer M. Milanković deduced, by means of calculations based on periodical variations of certain factors determining the orbit of the earth, the dates of a series of marked phases of diminution in solar radiation. Now Zeuner,[1] following Köppen, has compared the results of Soergel and Milanković and is able to show a close similarity in the two sequences: not only does Milanković show nine major declines in solar radiation, but between the fourth and the fifth he shows an extra long gap, which, if the radiation declines correspond to glacial advances, would be equivalent to the Mindel-Riss inter-glacial. If as Köppen and others suggest, the radiation and glacial oscillations stand in relation of cause and effect, it is permissible to apply Milanković's exact dates to Soergel's phases and so indirectly to the various Palaeolithic cultures. It is pertinent to add at this juncture that such a relationship is by no means generally accepted. On the assumption, however, that it is, Dr. F. Zeuner has recently published results which are summarized by Fig 23. From this it will be seen that an antiquity of something like 550,000 years is claimed for the earliest Palaeolithic culture, the Chellian, or Abbevillian as it is now called.

Is there any way of checking this? Yes, and no. There is no direct method available of counting back to the more

[1] *Geol. Mag.*, 1935, 350–76. See also the same author's *Dating the Past. An Introduction to Geochronology*. London, 1946.



[*After Zeuner*

FIG. 23

Milanković's radiation curve and the duration of Palaeolithic cultures

remote glaciations. On the other hand, there are means of checking the date of the last glacial onset of importance (Würm III). The method perfected by Baron de Geer, to be described in the next paragraph, allows one to count back to the time when the Scandinavian ice-sheet still extended to South Sweden. How long it took to cross the Baltic from North Germany is a matter for estimation. One can say, however, that a date of 18,000 B.C. for the Pomeranian moraine, which corresponds to Würm III of the Alpine sequence, is generally accepted as being in accord with de Geer's results. Now, if allowance is made for the inevitable time-lag between cosmic cause and geological effect, this tallies very well with Milanković's calculation of 23,000 years for the age of the last important solar radiation minimum. Other calculations include Heim's, who arrived at a date of 14,000 B.C., using as a basis the thickness and rate of growth of the delta of the river Muotta in Lake Lucerne. But the accuracy of Heim's result depends on the rather unwise supposition that the present rate of deposition is a just index of its former rate over a period of thousands of years.

It is due primarily to the labours of Baron de Geer that the chronology of northern Europe for the last 12,000 years is more surely founded than that for the Pleistocene period as a whole. The annual deposition of certain finely layered silts commonly exposed within the territory of the Scandinavian ice-sheet was recognized as long ago as 1769, but it was reserved to de Geer to realize their chronological possibilities. Interpreting each layer or varve as the product of a year's accumulation of silt in the melt-waters of the ice-sheet, he conceived the idea in 1885 of establishing a continuous sequence along the line of retreat, and so of being able to count the exact number of years taken by the withdrawal of the ice from point to point. As a glance at a clean section will show (pl. XXIV, lower), each varve consists of two parts, one thick,

pale-coloured and coarse-grained, representing the rapid silt of the summer melting-season; the other thin and dark, representing the slow sedimentation of fine grains during the winter months. This dual structure makes it an easy task to distinguish each varve from its neighbour. By measuring the thickness of each varve, therefore, it is not a difficult matter to express graphically successive variations in the annual sedimentation.

To achieve his aim it was necessary to link together varve profiles at intervals along the line of glacial retreat. This proved a task of some difficulty and it was not until 1904 that he managed to link his first two sections. Having once succeeded, however, he found it possible, with the experience thereby gained, to build up a sequence extending from Scania to the point in central Sweden where the ice-sheet split into two. The interval from this bi-partition to the present day was calculated by counting the silt layers deposited in Lake Ragunda, subsequently checked by researches along the course of the Ångerman River. By these means the date of 6,800 B.C. was obtained for the time of the bi-partition. Fifteen hundred varves accumulated between this and the deposition of the Fenno-Scandinavian moraine, which can accordingly be dated to 8,300 B.C. At this time the ice-margin extended from the mouth of Oslo fjord to the neighbourhood of Stockholm, entering what is now Finland somewhere between Abo and Helsinki, and sweeping up to the White Sea and across the Kola peninsula. Another 3,500 varves and the ice-margin was back somewhere near the extreme south of Sweden. Thus was de Geer able to entitle his famous paper of 1910 'A Geochronology of the last 12,000 years'.

The variations in annual sedimentation implied by the wide range in the thickness of varves (0·2–3·0 cms.) were ascribed by de Geer to minor fluctuations in solar radiation. That some more than local cause was at work is supported by the

fact that the sequence of variations seems to have been remarkably constant over the whole territory of the Scandinavian ice-sheet wherever it has been tested. M. Sauramo's researches in Finland confirm in the most impressive fashion the results obtained by de Geer in Sweden.[1] Attempts to extend the sequence across the Baltic have not met with general acceptance, any more than have the still more ambitious 'teleconnexions' between the Swedish varve-sequence and those in North and South America. If at any time in the future such teleconnexions should be successfully established, they would of course be of enormous value in building up a system of absolute chronology applicable to the whole world.

At present, however, the varve chronology can be applied only in northern Europe, and there only to such events as can be brought into relation to an old ice-margin or to actual varve sediments. The absolute dates assigned to the various phases of the Baltic are all based on de Geer's system. For instance, the transition from the Baltic ice-dammed lake to the Yoldia Sea, being defined by the movement of the ice-margin past the Fenno-Scandian moraine, can be dated to 8,300 B.C. From this it follows that within broad limits absolute dates can be assigned to anything datable in relation to the Baltic phases, such as human settlements on old strand-lines, the sequence of old sea-levels on the oceanic coasts of Scandinavia, the geographical evolution of the North Sea area, and the major phases in forest history of the Baltic area. Thanks to pollen-analysis it is possible, as indicated in a previous section (p. 123), to synchronize forest history phases in different parts of north-western and central Europe, so that the absolute dates shown, for instance, on the Federsee diagram (Fig. 19) are all derived ultimately from de Geer's varves.

Tree-ring chronology. The method of exact dating most

[1] *Bull. Comm. geol. Finl.*, no. 86 (1929).

easily and directly applied to archaeology is that which depends upon variations in the annual growth-rings of trees. Dendrochronology, as it is often called, is a biological counterpart of varve chronology, and, like this, is thought by its discoverer to record minor fluctuations in solar radiation. It was, indeed, discovered between 1901–13 during an investigation of the incidence of minor solar variations by Dr. A. E. Douglass, Director of the Arizona University Observatory. He was led to study trees because meteorological records were too short to afford the evidence of climatic fluctuations by which he hoped to reconstruct the course of minor solar fluctuations over a period of centuries.

In his researches he concentrated mainly on the yellow western pine (*Pinus ponderosa*) and the Scotch pine (*P. sylvestris*), as possessing well-defined growth rings. Marginal forests in North Arizona and New Mexico he found to be especially favourable, because dry conditions made the trees peculiarly sensitive to minor climatic changes. As a basis he studied living trees, cross-dating many trees of the same age to make sure of eliminating individual or purely topographical variations. By these means he obtained a sequence of some 500 years. His next step was to extend by using the 'bridge-method'. This involved first of all finding dead timber incorporated in ancient structures, which nevertheless overlapped with the lower end of the living sequence, and then tying on timbers from successively more ancient structures. By such means he has already succeeded in prolonging his sequence back to the beginning of the first century A.D.[1] When a building contains substantial timbers within the span of the continuous sequence established for the area, it is often possible to determine the date of its construction and of any important alterations. For instance the well-known ruin of Pueblo Bonito has been shown to date from A.D. 919 and to

[1] For further details, see *Antiquity*, 1937, 409–26.

have received additions in 1060–70 and again in 1090. Traces of an intense drought revealed in stunted growth-rings for the period 1276–99 provide a motive and probable date for its abandonment.

As in the case of varves, attempts have been made to connect sequences of tree-growth rings in different parts of the world. A well-known instance is that of a wooden fortress built in Lake Tingstade Trask, Gotland, Sweden, timbers of which were measured and claimed to fit into the sequence of 3,200 growth-rings given by the *Sequoia* pines of California (pl. XXIV, upper) so as to indicate a date somewhere in the middle of the fifth century A.D. for its construction. In the existing state of knowledge, however, such teleconnexions are at best premature and even tend to bring discredit on the whole method. For a region such as that in which Douglass has worked it is very well; but for its extension to other areas it is necessary first to build up local sequences. To judge of the possibilities one has only to think of the Swiss Lake Villages being dated in terms of the years during which their component timbers were cut. The first measurements of tree-growth rings from an ancient structure in Britain were made in 1934, when timbers from the Ballinderry crannog in County Westmeath were examined; perhaps some day these and other measurements will be fitted into local sequences and the structures accurately dated in terms of absolute chronology.

Dates based on human records. The period of history measured by human chronology amounts to approximately five millennia. Compared with the half-million and more years allotted to the Palaeolithic epoch, this is short indeed; but the importance of a period can no more be measured by its mere duration than the value of a find can be assessed in terms of its antiquity. Amateurs of 'worked flints' are thrilled to handle objects 'thousands of years old' and, as

prehistorians know to their cost, are prone to exaggerate the age of what they find. So long as the professionals were still in the stage of producing rabbits from hats to make their audiences gape, they also were prone to lengthen dates. But, now that 'evolution' is an accepted fact and the antiquity of man established, they are often to be found on the side of shorter chronologies. It is as well to be suspicious of the man whose comment on an archaeological find tends to stop short at 'dating it'.

Certainly there is an epic flavour about Palaeolithic studies which attaches to no other field of archaeology. Yet, if students of later periods are unable to measure cultural development by major geological changes, they have the compensation of investigating the origin and diffusion of those higher arts upon which our own civilization is ultimately based. The beginnings of food-production and its attendant developments go back in certain favoured parts of the world two or three millennia before the dawn of history. But their spread into Europe and the development there of local Neolithic and Bronze Age cultures are strictly contemporary with the early historic periods of Babylonia and Egypt, whose absolute dates can thus, when links are available, be transferred to European prehistory. In the same way early Chinese chronology is relevant to the prehistory of all those extensive regions into which Chinese exports of the historic period found their way.

In the space available it is not possible to do more than glance at the chronological systems in these three early centres and see on what they are based.

Before being unduly impressed by Egyptian chronology it is worth remembering that until 525 B.C., when the accession of the Persians brought Egypt into the realm of exact historical dates, none of the figures one sees quoted are or can be more than approximations. However, by adding

together the totals of reigns and dynasties it is possible to count back some 1,052 years to the accession of Ahmose I, a reckoning which, if it is correct, gives a date of 1577 B.C. for the beginning of the XVIIIth dynasty and of the New Kingdom. Were it not for astronomical methods, for dates prior to this time one would have to rely upon such documents as the Turin papyrus,[1] helped out by a few stelae and synchronisms with Babylonian 'dates' in little better case.

Fortunately the Egyptians based their calendar on observations of the heliacal rising of Sirius (Sothis), that is, its latest visible rising before sunrise. Further, although arriving at a year 365 days long, they failed to intercalate one day each four years to provide for leap years. As a result their calendrical dates soon lost all relation to the seasons and, in fact, passed through a complete cycle every 1,460 (4 × 365) years. Now, since it is known that a new 'Sothic cycle' began in A.D. 139/43, it can be inferred that earlier cycles began in 1321/17, 2781/77 and 4241/37 B.C.[2] Consequently, when documents mention the heliacal rising of Sirius as falling at a certain date in a certain year of a king's reign, it is possible to compute from the loss of days implied the absolute date of the year in question. Using this method, in combination with such other evidence as is available, the dates of most of the kings of the XIIth and XVIIIth dynasties have been determined to within four years. The fact that the 'astronomical' date for the opening of the XVIIIth dynasty (1580/76) tallies with that arrived at by direct reckoning (1577) suggests

[1] Originally compiled in the XIXth dynasty it has been so much garbled by copyists as to have lost much of its value.

[2] Often cited as the 'earliest date in human history'. It may be the oldest 'date', but its relevance to 'history', which according to the best modern estimates it antedates by over 1,000 years, is less clear; nor is it possible, as yet, to relate it to any specific prehistoric stage. It stands simply as the hypothetical date for the introduction of the calendar.

that we can accept the 'astronomical' date for the beginning of the XIIth dynasty, viz. 2000/1996.

Prior to this date there are no fixed points in Egyptian chronology apart from the possible inception of the Sothic calendar. An idea of the range of computation can be had by comparing two leading authorities writing at the same time:

	Eduard Meyer (1904)	*J. H. Breasted* (1905) [1]
	B.C.	B.C.
Ist dyn. . . .	4186	3400
IIIrd dyn. . . .	3642	2980
VIth dyn. . . .	2920	2625

The advance of knowledge during the generation which has since elapsed has made it possible for a recent authority [2] to say of the beginning of the Dynastic period that 'the coincidence of Egyptian and Mesopotamian sources is now close enough to permit of this horizon being dated with general consent about 3100 B.C. ± 100'. Prior to 2000 B.C., in fact, one has to allow a margin of error of a century either way.

In Mesopotamia we find much the same conditions, despite the king-lists, which purport to tell the names of kings arranged in their dynasties and to state the number of years each one reigned. In the form in which these have come down to us they are mere compilations, set down in some cases thousands of years after the event and reported at many hands. One of the best known was compiled by one Berosus, a priest of the god Bel at Babylon, who dedicated his work to Antiochus I Soter (280–261 B.C.); his work, itself hardly an impeccable source, has come down to us only in the versions set down by Josephus, Eusebius and others. For the earlier stages of Mesopotamian history the figures in the

[1] Breasted's *Ancient Records of Egypt*, Chap. I, pp. 25–47 is still the best introduction to ancient Egyptian chronology.

[2] Prof. V. G. Childe, *Rep. Brit. Assocn. for the Advancement of Science*, 1938, 185.

king-lists are admittedly fantastic : the ten antediluvian kings are variously credited with having reigned in all for a period of from 241,200 to 456,000 years.

By different means it has been possible, as already mentioned, to compute the age of the Ist dynasty at Ur to within a century, but it is not until the IIIrd dynasty, to which Woolley assigns the dates 2278–2170, that there is any approach to accurate dating. The date of the accession of the last king of the IIIrd dynasty at Babylon (Hammurabi) seems to be fixed somewhere about 1960–40, but the first really fixed date in Babylonian history is 747, when Tiglath-Peleser III ascended the throne. For Assyria the *limmu* lists carry us back to 893, and for Palestine fixed dates begin with the death of Ahab in 855/4.

The Chinese were too well bred to vaunt the antiquity of their early kings in the manner of the latter-day Babylonian priests. Nevertheless the length of Chinese history has become something of a legend in the Western world, a legend, however, which modern archaeological discovery has done much to discount. The earliest dynasty to receive even tentative dates is the Shang, which flourished towards the end of the 2nd millennium B.C., but for this the best authorities allow a margin of error of a century. The earliest exact date generally accepted (841 B.C.) goes back to much the same time as those of the Near East.

How far can the exact dates of the lands with ancient histories be used to extend absolute dating to regions yet in a prehistoric stage ? Space forbids a detailed answer, but certain principles can be stated quite briefly. First, one ought not to expect great precision, since, while at one end we may have an historic record of rapidly succeeding events, at the other we have to deal with unwieldy periods or phases of cultural development seldom less than two centuries in duration and often very much longer : the most one can hope for, except where

fine sequence-dating is available, is that the upper and lower limits of stages defined in terms of relative may be given values in absolute chronology. Second, it must always be remembered that, prior to the second millennium B.C., the absolute dates of the early centres are themselves subject to readjustment; any dating system founded on them is necessarily, therefore, provisional. Thirdly, the methods by which historic dates are extended to prehistoric provinces vary in accuracy and always introduce some element of uncertainty.

In the case of contiguous regions at the same general level of culture, e.g. Egypt and Crete, synchronisms are liable to be fairly exact, especially when the relative chronology of the prehistoric province has been as carefully established as the Minoan. Reciprocal trade has brought it about that Minoan pottery has several times been found in Egyptian tombs and *vice versa*, so that cross-dating, particularly for the XI–XIIIth and XVIIIth dynasties when trade was especially active, is well founded. Even so, as the following table shows, nothing more than round-figure dating is attempted for each of the chief stages of Minoan history,[1] and most of the earlier ones are based on little more than estimation:

Crete			*Egypt*	*Absolute dates* B.C.
Late	Minoan	III		1400–1100
L.	M.	II		1500–1400
L.	M.	I	XVIII dyn.	1580–1500
Middle	Minoan	III	XIII–XVI dyn.	1700–1580
M.	M.	II	XII–XIII dyn.	1900–1700
M.	M.	I		2100–1900
Early	Minoan	III		2400–2100
E.	M.	II		2800–2400
E.	M.	I		3100–2800
Neolithic				? –3100

[1] A reliable work to consult is J. D. S. Pendlebury's *The Archaeology of Crete; An Introduction*. London, 1939.

The more indirect are correlations the wider is likely to be the margin of error. Thus, the absolute dates applied on the basis of Minoan links to stages in the civilization of the Cycladic Islands and of the Greek Mainland (Helladic), are less reliable than those applied to Crete itself on the strength of direct relations with Egypt. Contacts between the Helladic province and the merchant cities of Troy or the peasant cultures of the Danubian area are of even less value from the point of view of absolute chronology, while by the time the chain has been extended from the Danube to the West Baltic the potency of Egyptian dating has declined almost to vanishing point.

There are many difficulties inherent in any attempt to apply 'civilized' dates to cultures in 'barbarous' lands on the basis of elements diffused from one to the other. A material culture form or technique may have had a long life in its home area, and it is seldom easy to know precisely at what stage it spread to the outer world. Then, again, there is the difficulty of deciding how quickly individual traits spread from one region to another. Fundamentally it is a question of the duration of the 'time lag' which lies at the bottom of the problem.

The only reliable way of extending absolute chronology to outlying parts of the prehistoric world is to fasten upon some distinctive, but short-lived, feature which is known to have spread rapidly. This applies to the faience beads, which in Egypt occur at Tell el Amarna (limiting dates 1380–50 B.C.), in a tomb at Abydos containing a scarab of Amenhotep III (1412–1376 B.C.), and in Wessex graves dating from the end of the Early Bronze Age. Their distribution shows them to have been transported by sea, so their diffusion must have been rapid and they can, accordingly, be used with safety to provide a maximum date for the Wessex graves of *c.* 1400 B.C. This, of course, is the most they can tell us, because exotic

objects are often treasured by barbarous people over long periods, but any light is better than none in the prehistoric night. Another instance of the value of datable exports is afforded by the astonishing stone ruins of Southern Rhodesia. At Zimbabwe and elsewhere the excavators found ' Chinese porcelain, Persian faience, Indian and Venetian beads (and) Arab glass ', all of mediaeval date, wherewith to confound upholders of the high antiquity of these sites.[1]

References by civilized travellers, classical travellers in the prehistoric provinces of Europe or white pioneers in parts of Africa or Oceania, often throw light on the antiquity of things they have seen or heard about.

Finally, the conquest or peaceful penetration of a country by people in the habit of recording their history, in bringing its prehistoric period to an end, will nevertheless draw a base-line from which absolute dates may occasionally be reckoned. The abortive invasion by Julius Caesar (54 B.C.) and the conquest by Claudius (A.D. 43) provide the only certain dates in British prehistory.

[1] For an introduction to the problems of Zimbabwe reference may be made to Miss G. Caton-Thompson's article in *Antiquity*, 1929, 424–33.

CHAPTER VI

INTERPRETATION

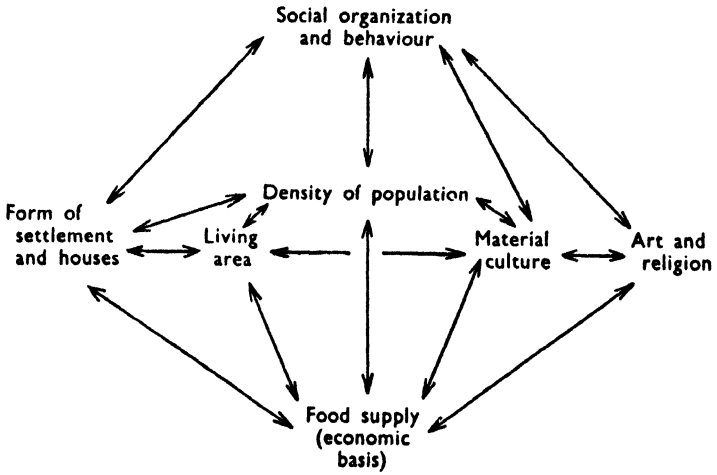
ALTHOUGH archaeologists have all too often been inspired by idle curiosity or the desire to acquire objects for their own sake, it remains profoundly true that the only scientific purpose of digging things up is to assemble material from which to interpret the past. Often enough the archaeologist's spade has added to the world's literature by bringing to light inscribed stones, potsherds, papyri or tablets of wood or baked clay, but generally it is circumstantial rather than literary evidence. And for long periods of human history, including those during which most of the fundamental inventions were made, no other form has survived.

If Mr. Ford's saying about history had been applied to prehistory it might have had on the surface at any rate more justification. Certainly archaeologists dig up and quarrel over what from a material point of view may be worthless—scrap metal, chipped flints, broken pots and the like. Yet the mere fact that archaeology has to deal with domestic odds and ends rather than official documents—and to the archaeologist the layers of a rubbish heap may be as informative as the archives of a state department to the historian—shows that its contacts with the lives of ordinary people is intimate and close.

Indeed, when an archaeologist speaks of 'the past' he really means 'the people of the past'. The ultimate aim of all his digging and delving, his piecing together and his reconstruction is to find out how people lived. He tries to

interpret his finds in terms of the societies of which they are indications.

It stands to reason that archaeological technique alone is not sufficient to achieve this aim. The excavator can hope to obtain concrete evidence only of those aspects of life which are normally expressed in material things. Everything else he has to infer from what he can recover, drawing freely, but with circumspection, on his knowledge of still living cultures. Perhaps we may begin by indicating in tabular form the structure of a society, so as to make clear the inter-relations of its different aspects. The following over-simplifies the position, but will serve my purpose quite well :



FOOD SUPPLY

One of the first things an archaeologist wants to establish is the economic basis of the people he is studying, above all the source of their food-supply. Were they food-gathering or food-producers ? If the former, did they depend mainly on hunting or did they fish, fowl or collect wild vegetable

foods? Among the primitive peoples who still exist in this stage the source of food-supply varies with the seasons: it is obviously important to find out how far such variations existed in the past, since what would otherwise appear to be more than one culture might in reality represent only seasonal functionings of the same one. If food-producers, it is of interest to establish to what extent their economy still included the old food-gathering activities. Precisely what animals and crops were domesticated and cultivated, where did they originate and how were they acquired by the people concerned are other questions which call for an answer. The methods actually used to hunt and kill animals or to raise crops are also of fundamental importance. Last, but not least, one wants to know as much as possible about the way in which food and drink were prepared. Has it not been written that a people may be known by its beverage? When archaeologists of the future come to study the stratification of London, it may be that the rise of the tea-cup and the relative decline of the beer-bottle will be regarded as marking a decisive stage in the history of the British Empire.

Concrete evidence for the reconstruction of the food-supply can be found on most sites in the form of mammalian, bird and, occasionally, fish bones. Too often the lists of fauna from Palaeolithic caves and rock-shelters are treated as though they were only of palaeontological interest: actually they give a good indication of the animal-food of early man.

For later sites, from the Neolithic onwards, the bones of domesticated animals claim most attention. From the study of ox, pig and sheep bones much may be learnt of the time and place of the great economic revolution which divides the Neolithic world from that of the food-gathering Mesolithic and Palaeolithic, and of the routes by which individual species were introduced into Europe. Already it is apparent that it is on sites dating from the earliest stage of the

Neolithic in Europe, those of the peasants who cultivated the loess between the Rhine, the Vistula and the middle Danube in the first half of the third millennium B.C., that the greatest predominance of domesticated over wild animal bones is found; during the later stages of the Neolithic, and in some areas during much of the Bronze Age, wild animal bones tend to be more strongly represented. This is, of course, due to the fact that the fundamentals of Neolithic life reached Europe from outside. After the first arrival the resurgence of the old hunting economy seems quite a natural reaction. It was not until the close of the Bronze Age, when settled farming took root in our part of the world, that the chase was relegated to a role of economic, if not yet of social, inferiority. Let the animal bones from the lake village at Glastonbury speak for themselves:

Wild animal bones		*Domesticated animal bones*	
Red-deer	2	Horse	73
Roe-deer	6	Ox	181
Wild boar	4	Pig	58
– – – –		Sheep	3013
Fox	4	Goat	6
Wild cat	5	Dog	24
Otter	36		
Beaver	14		
Total	71	Total	3355

Taking the gross totals it will be seen that wild animals account for no more than $\frac{1}{47}$th of the total. If we subtract from the list of wild animals those killed for their skins, and confine ourselves strictly to food species, the proportion of wild forms declines to $\frac{1}{280}$th.

Much can be learnt also from plant remains, particularly from cultivated grains. It rarely happens that conditions are as favourable as in the lake villages of the Alpine area

(see p. 63), but carbonized grains are to be found quite often if a careful search is made. Where everything else has perished, impressions on pottery and other clay objects received prior to the firing will sometimes give useful identifications. The Danes in particular have made use of this method, as the table printed below well illustrates. The percentage proportions are shown of the various grains represented on sherds of each period of Danish prehistory from Neolithic onwards, only excluding the early and middle phases of the Bronze Age, for which too little evidence is yet available. The total number of impressions for each period is shown in brackets at the head of each column.

	Neolithic (409)	L. Bronze Age : 8/400 B.C. (241)	Pre-Roman Iron Age : 400/0 B.C. (30)	Roman IA : 0/200 A.D. (247)	Roman IA : 2/500 A.D. (225)
Wheat . .	86·8	9	3·3	1·6	2·6
Barley . .	13·2	88	96·7	78·1	84
Oats . . .	—	3	—	15·8	6·7
Rye . . .	—	—	—	4·5	6·7

The table illustrates some remarkable changes in the proportions of different grains grown during prehistoric times in Denmark.[1] Thus, whereas in Neolithic times wheat was the predominant crop, by the Late Bronze Age barley had displaced it, retaining its position as the leading crop throughout the remainder of prehistoric times. Oats and rye do not seem to have come into use until the present era, but in the first two centuries they together account for slightly more than a fifth of the grain crop. What the table seems to bring out is a trend towards the cultivation of hardier

[1] Based on G. Hatt, *Landbrug i Danmarks Oldtid*, pp. 20–3. Copenhagen, 1937; see also *Antiquity*, 1938, pp. 136–8.

crops and it may be that in this we can see the effect of some change of climate. Certainly it is known that in the Early Iron Age climatic conditions in north-western Europe were degenerating ; for instance the Iron Age settlement of Norway appears to have contracted by nearly 8° of latitude when compared with that of the Bronze Age.

Means of subsistence are inevitably reflected in material equipment. Except where conditions give rise to warfare, as in border zones like the Rhineland, peasant communities will not be over-provided with weapons : conversely the absence or rarity of weapons and the presence of such forms as the hoe or plough, the sickle and the quern all point to an agricultural basis. The implements used for tillage and the form of the fields allow one to determine the stage of development reached by an agricultural community. For instance in southern Britain three distinct stages can be recognized in prehistoric agriculture, each of them identifiable with waves of immigration : in the earliest or Neolithic stage tiny corn-plots were cultivated by the hoe and new ground had continually to be broken up ; by the Late Bronze Age a more settled and intensive type of agriculture was brought into Sussex and parts of Wessex based on the cultivation of squarish plots between a half and two acres in area by means of a light two-ox plough, a method which became general in the Early Iron Age and survived on light soils throughout the Roman occupation ; and, finally, the Belgae brought in the heavy wheeled plough drawn by four or eight oxen, by which heavy soils could be cultivated and long furrows ploughed.[1]

In the same way the equipment of people in a Mesolithic

[1] Dr. E. C. Curwen, 'The Early Development of Agriculture in Britain', *Proc. Prehistoric Society*, 1938, 51. See also E. Barger, 'The Present Position of Studies in English Field-Systems', *The English Historical Review*, CCXI (July, 1938), 385–411.

or Palaeolithic stage of culture will often reveal something of the methods actually employed in obtaining their food. Digging-sticks or their weight-stones tell of root-grubbing, nets, fish-hooks and leister-prongs of fishing, and arrows, spears and throwing-sticks of hunting. But equipment, of which only the less perishable parts normally survive, is not always easy to interpret. The most convincing way of finding out how fish were caught and animals hunted is to find the skeletons of creatures which, though mortally stricken, had managed to elude their pursuers. The discovery in old Mesolithic lake-beds in Sweden and Esthonia, for instance, of pike skeletons closely associated with bone points finely barbed on one edge shows that the Maglemose people speared their fish, using leisters or pronged instruments consisting of two or more bone members bound to a wooden shaft. Bone points with notches or a perforation near the base have long been interpreted as harpoon heads, but proof has only come with the discovery at Närpiö and elsewhere in Finland of complete seal skeletons with the weapons still in position. Similarly flint microliths, characteristic of Mesolithic industries beyond any other form, have usually been explained as the heads and barbs of arrows. The wooden shafts, in which they were presumably set, have, however, decayed and the only worthwhile evidence comes from chance finds of victims. The most famous is an aurochs from Jyderup, near Vig, in North-west Zealand, in the breast region of which were found three small flakes, two of them with the steep microlithic secondary flaking. The fatal arrow was that which pierced the seventh rib and must have penetrated the lung. The aurochs seems to have led a somewhat harassed existence because flint splinters were also found in an old and nearly healed wound in its ninth rib.

The actual preparation of food is more difficult to reconstruct. A study of animal bones will sometimes throw some

light on methods of butchery, but that is about the limit of our knowledge of the meat course. We are in little better case with vegetable food. It is known that at Glastonbury and at the lake-villages of Switzerland cakes of whole grains of wheat were kneaded with honey; that the early Swiss were partial to caraway seed; and that barley porridge and a curious meal of barley mixed with linseed and cameline was eaten by the Early Iron Age peasants of Jutland. We learn also from the residue in the base of a birch bark vessel from one of the oak coffin burials of the same country that during the Early Bronze Age cranberry wine was sometimes mixed with myrtle and honey. Such scraps of information are sufficiently meagre, but they encourage the hope that with the more intensive application of bio-chemistry to archaeology much more will be learnt of this important aspect of prehistoric life.

LIVING AREA

The type of country chosen for settlement both depends upon the economic development of a people, and at the same time affects that development in a variety of ways. Fully to understand a culture, therefore, it is essential to define its distribution in relation to topographical and geological features. The most commonplace objects, while intrinsically they tell us little, can nevertheless by their mere position tell us something of the people who made them.

There are certain interrelations between economic life and the endowment of the area of settlement too obvious to require further comment. Shell-mounds and coasts or tidal estuaries, agriculture and loess patches, pastoralism and chalk or oolite hills are only a few outstanding examples. The disposition of raw materials has played a vital part in the evolution and diffusion of culture: without a knowledge

of the distribution of gold, amber and tin the story of the European Bronze Age would be difficult to unravel, while the role of salt in the Early Iron Age is only less impressive. The importance of trade in rare but much sought-after materials has already been indicated in discussing chronology (pp. 149 f.): it is hardly necessary to emphasize its direct bearing on cultural development. The effect of local building materials on the character of early structures was naturally profound: for instance oolite lends itself to dry-stone walling, corbelled roofs and rounded house-plans, while large slabs of stone or timber beams tend towards angularity of plan and the use of pillars or posts.

The physical environment of early man, both biological and geographical, was continually changing, and it is therefore important to study a particular culture in its proper context. To secure this it is vital for archaeologists to maintain close contact with natural scientists—geologists to reconstruct geographical development, botanists to reclothe the landscape with its former vegetation and zoologists and palaeontologists to repeople it with its ancient fauna. Of no less importance is the evolution of climate, some of the effects of which upon economic life have already been touched upon.

In order to bring the sciences to bear upon problems of early man's physical environment it is obviously necessary to recover remains of his material culture at their proper levels in deposits capable of yielding the evidence required. For Lower and Middle Palaeolithic times correlations are most easily made in clay or gravel pits, where flint implements can be traced to their parent deposits, the nature and fossil content of which will tell their own story. Cave sequences are particularly valuable for Upper Palaeolithic times; a careful examination of the different layers will not only reveal changes of fauna, but sometimes basic changes of climate. For the later stages of prehistory bogs and fens hold the best

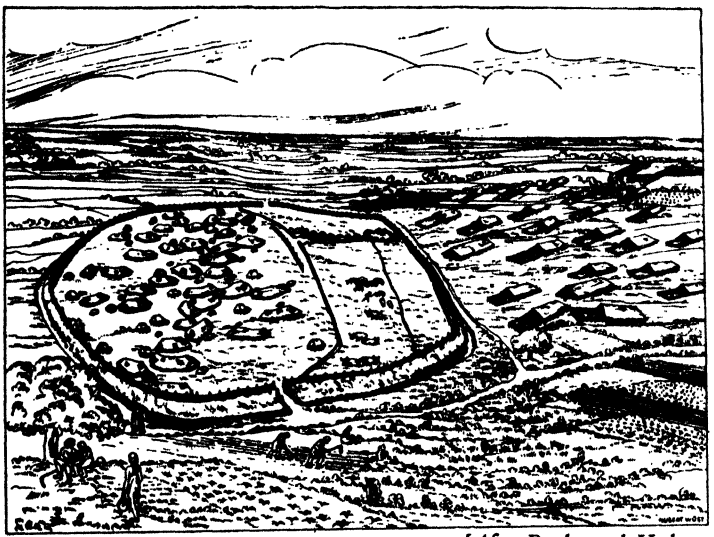
clues, especially where early man has been obliging enough to live so close to growing deposits that odds and ends of his material culture find their way in to mark an appropriate level in the stratigraphical sequence. Much can also be learnt of local conditions from the identification of such organic remains as survive on the normal dwelling site, including charcoal, carbonized plant remains and snail-shells.

HOUSES AND SETTLEMENTS

In interpreting house forms, which depend partly on the general level of economic development and partly on the natural endowment of the area of settlement, it is important to keep in mind seasonal, economic and social specialization as well as cultural predispositions. It is the failure to comprehend the complexity of the subject that has led to many serious errors. An outstanding instance, now crystallized as a popular notion, is the designation of the Upper Palaeolithic as 'the Cave period' and of Upper Palaeolithic people as 'Cave Men'. The plain fact is that, given certain social conditions, and the presence of available natural shelters, caves have always been, and probably always will be, inhabited during certain seasons of the year. In the Peak District of England caves were much used by Neolithic 'B' people, one of the most important domestic finds of the British Late Bronze Age was made in Heathery Burn Cave, Co. Durham, and cave-dwelling actually reached its greatest development in Britain during the second and third centuries A.D.

Not only is it abundantly obvious that cave-dwelling was far from being confined to Upper Palaeolithic times: it is now established that even during this period caves were only winter-dwellings. Ironically, it is the tectiform designs found on the cave walls themselves which give us an indication of what the summer huts were like. Further, archaeological

research in the U.S.S.R. since the Revolution has shown that where natural shelters were not available, artificial winter-houses were made which belong to the same general family as those in use more recently in North-east Asia, the extreme north of America and Greenland.



[*After Buttler and Harberey*

FIG. 24

Reconstruction of the Köln-Lindenthal settlement (cf. Fig. 12) during its fourth phase

Sometimes it can be established that a particular form of house is characteristic of a particular culture, but before accepting such a conclusion one has to be quite sure that one is really comparing like with like. So often it happens that the same people will employ different types of building for different purposes. For instance, while the dwelling-houses of the Neolithic 'Danubian I' peasants were of irregular plan

with the floors scooped out of the loess and the walls formed of light wattle-work, their domestic granaries were small rectangular structures raised on piles to escape animals and damp, and their field-barns were of elongated rectangular form, sometimes exceeding 30 metres in length and 7 metres in width.

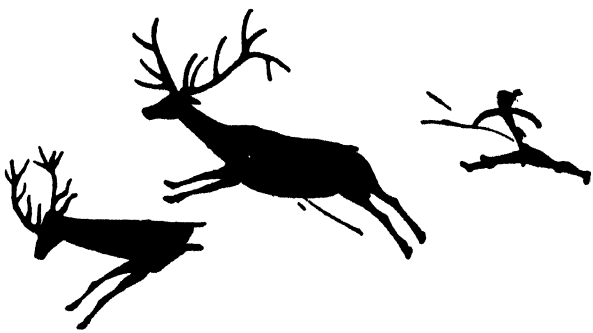
When, as happens all too rarely, a whole settlement is uncovered, much can be learnt from its general lay-out. At Köln-Lindenthal the interesting fact was brought out that, whereas in the earlier stages no special arrangement could be noticed, in the last phase, dating from the period of fortification, only the houses and domestic granaries were inside the enclosure, the field-barns being left to take their chance outside (Fig. 24). It is worth noting that at times the population of the site seems to have fallen as low as 50, while at no time did it exceed 250–300. Further, the absence of any house of outstanding size or special character emphasizes the essentially peasant character of the culture.

MATERIAL CULTURE

The material remains of an ancient culture, the implements, weapons and equipment of daily life, form the backbone of archaeology. Yet even here the evidence is often lamentably incomplete. If any one remains unconvinced after reading Chapter III, let him consider the material equipment of an existing primitive people and ask himself how much of it would survive even a few generations under normal temperate conditions. A point worth bearing in mind is that as a rule low cultures will tend to survive less completely than more developed ones, since they are liable to make more general use of perishable substances.

It goes without saying that in studying any particular culture the fullest use should be made of exceptionally well

preserved finds. For instance the oak coffin burials of Jutland ought to influence our interpretation of the Early Bronze Age in the Nordic area out of all proportion to their numerical importance among the material available from this time. Conversely, when such finds are lacking, every effort should be made to investigate sites likely to produce them. The skeleton of a prehistoric culture is liable to be made up of stone, metal and clay components, but when once we have pieced it together all efforts should be concentrated on clothing



[*After Obermaier*

FIG. 25

Wall-painting of Stag-hunt. Albocácer, Eastern Spain

it with flesh. That is why bogs, fens and old lake beds have so great a future in the development of European prehistory.

In the meantime some of the missing elements can legitimately be supplied by inference from what is already available. For instance, arrowheads imply bows ; gouges and chisels, carpentry ; spindle-whorls and loom-weights, weaving ; and sword-chapes, scabbards. Fundamental differences in dress could be inferred from the fastening device, even had no trace of actual material survived : the buttons of the British Bronze Age, for instance, contrast with the safety-pins (fibulae)

ledge of the material culture of the masses. In the early days of archaeology—and it is essential to realize that it is still early days in many parts of the world, a large part of the U.S.S.R. included—attention has as a rule been directed to burials, as the most obvious sites; but often only the graves of the upper classes leave any trace above ground, and the poorer graves when they are located do not tend to be very informative, since the bereaved were often unable to afford anything more than the simplest grave goods. It is significant that the Soviet archaeologist Trever, writing of the graves of northern Mongolian nomads (see pp. 75 ff.), has to lament that:

> We are acquainted as yet only with objects illustrating the daily life of the upper classes; there is nothing to enlighten us on that of the craftsmen and workmen, who toiled at the artistic achievements in embroidery, dyed the wool, worked the mines, cast the metallic vessels and pole ornaments, dug the graves and constructed the burial chambers of their lords.

However, it remains important to keep the existence of classes in mind where such existed in the society under consideration. It will often be found that the lords were alien conquerors with exotic traits lacking from the culture of their native subjects.

One obvious way of gaining an insight into features of an ancient culture which might otherwise be obscure is to seek parallels in existing societies. But here a word of warning is necessary. It is essential to remember that the forms assumed by given traits of material culture result from the interplay of forces, environmental, social and cultural, which can never operate in quite the same way in different societies; consequently what appears to be the same form may in reality have quite a different history, function and significance in two or more cultures. For this reason ethnographic parallels,

while frequently suggestive, must be used with the greatest care. It is desirable to select parallels from cultures which do not differ too profoundly in environment and general cultural level, and, where possible, from cultures showing not too remote historic links. In interpreting finds from Mesolithic Europe parallels from the Eskimo cultures are thus liable to be more valid than those drawn haphazard from all over the world.

Indeed, the most valuable links are often to be found between prehistoric and existing folk-survivals in the same culture area. For instance the poorer farm-houses of Jutland differ hardly at all from those of the pre-Roman Iron Age excavated by Hatt: both are long and rectangular in plan, in both the prevailing wind dictates that the western end be reserved for human habitation, and in both the ordinary glacial pebbles of the country are used for paving the threshold. Again, one of the best ways of appreciating the conditions of life in highland Britain during the Early Iron Age is to visit the Hebrides, although, as Curwen observed, conditions are changing rapidly in these days: hand-made pottery is already being replaced by the glazed wares of Messrs. Woolworth and the 'black houses' are retreating before the fiat of the Minister of Health.[1]

In interpreting difficult points in the field local knowledge may be quite invaluable. Sir Aurel Stein, when he was examining the ancient settlement of Niya in Khotan, described in a previous chapter (pp. 57 ff.), was temporarily at a loss to explain the purpose of two tree trunks placed side by side at an interval of two feet and half buried in the floor of an outhouse. But his native helpers immediately recognized them as a primitive kind of ice-safe of a type which had continued in use in those parts up to the present day. The winter's ice was heaped between the trunks, which were

[1] *Antiquity*, 1938, 261 ff.

set at just the right interval to keep the blocks from touching the ground, and then covered with poplar leaves. To verify the testimony of his men Stein cleared the sand and sure enough found successive layers of poplar leaves.

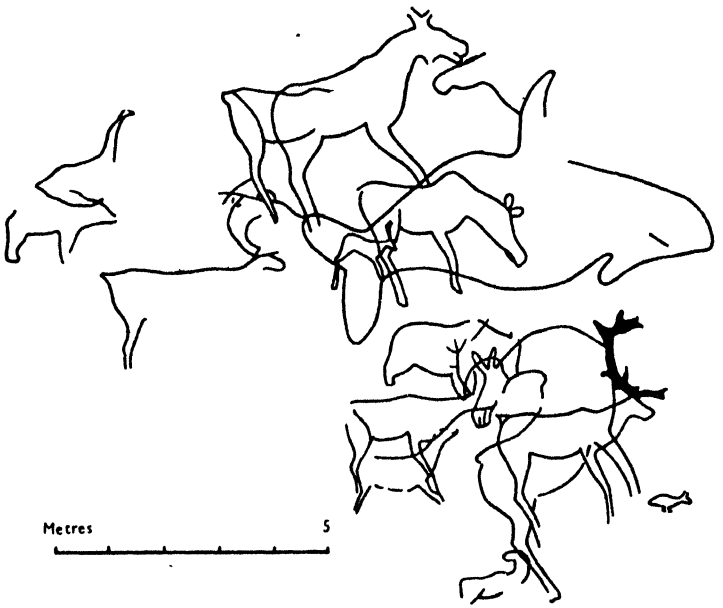
ART

Archaeologists have not been slow to appreciate the value of art as a means of gaining an insight into the genius and outlook of peoples of remote antiquity. What is not perhaps so widely realized is the incompleteness of the evidence upon which our estimates have necessarily to rely.

The arts of story-telling and of drama have been lost in their entirety, unless occasionally they survive in folk-traditions and tales. Music is gone beyond recall, although the rarely surviving instruments give some inkling of its technical limitations. Even the plastic and pictorial arts survive only in so far as they have been expressed in durable substances. Wood must ever have been a favourite medium for carving, but it is comparatively seldom that it is preserved for any length of time. Rock-engravings, to choose another instance, must have come down to us far more completely than paintings, although even these, when protected by overhanging rocks or an arid climate, manage to survive better than one might have expected. Of the minor arts applied to objects of daily use the decoration of pottery and metal objects is normally well represented, that of textile and basket decoration only rarely.

But these circumstances, although they serve to emphasize the dangers of arguing from negative evidence, by no means lessen the value of art in the interpretation of ancient cultures. In it economic preoccupations may often be clearly reflected, as one can see by contrasting the art of the Arctic hunters and fishermen of northern Scandinavia with that of the

Bronze Age cultivators of Bohuslän : in the one the engravings are set in wild country and depict wild animals, elk, reindeer, bear, whale, halibut and sea-bird, the figures being separate entities frequently overlying previous ones and rarely



[*After Hallström*

FIG. 27

Naturalistic rock-engravings at Leiknes, Norway

showing any signs of grouping (Fig. 27) ; in the other they are usually near cultivable ground and in their scenes with contending warriors, horsemen, ploughmen and ships give one the impression of a more settled and highly integrated society.[1]

[1] For the Arctic art, see a short account in *Antiquity*, 1937, 56–69 ; also G. Hallström, *Monumental Art of Northern Europe from the Stone Age : I. The Norwegian Localities*. Stockholm, 1938. For the Bronze Age group, see A. Norden, *Ostergötlands Bronsålder*. Linköping, 1925.

Yet, although it often happens that hunting peoples are associated with a more or less naturalistic art, the coincidence is very far indeed from being invariable. Further, even in Upper Palaeolithic Europe, great differences in style can be distinguished in different areas; contrast for instance the vigorous naturalism of the French and North Spanish rock-shelter art with the refinement, almost Chinese in flavour, of that of Eastern Spain. This reminds us, that, although economic factors are liable to influence very powerfully the forms of art, there is something in its expression which reflects the finer sensibilities of a people and in the last resort defies analysis.

RELIGION

In default of literary evidence it is naturally impossible to arrive at any very definite ideas as to the beliefs held by early man about the supernatural or the methods he adopted to influence powers upon which he felt himself to be dependent. In the presence of phenomena for which he is unable to advance any rational explanation the archaeologist is almost as prone as early man himself to resort to 'religion'. It requires little imagination to realize that this process is a dangerous one, liable to play into the hands of cranks of all descriptions. For those who want to keep the fair garden of archaeology from being trampled flat by hordes of fertility- and sun-worshippers, adherents of Druidism, reverers of the Great Pyramid and the like, caution in these matters is golden. Nevertheless there are certain deductions which can be drawn from archaeological evidence.

The intense desire of early man to ensure the continuance of himself and the animals and plants upon which he depended seems at most times and in most places to have given rise to fertility cults. Evidence for such may be found as far

back as Palaeolithic times in the Aurignacian statuettes of pregnant women and possibly in the sexual scenes engraved and painted on cave walls. The worship of the Mother Goddess among the earliest farming communities of south-eastern Europe and the Near East can be inferred from the figurines found on their sites. Phalloi and baetylic stones are other features of Neolithic and later cultures which point to fertility cults, but it would be superfluous to multiply examples.

Successful hunting being a matter of life and death to Upper

[*After Breuil*

FIG. 28

Engraving of wounded bison at Niaux, Ariège, France

Palaeolithic man, it is not surprising to find that he enlisted magical help to bring him luck. Perhaps he hoped to secure victims by drawing creatures such as the Niaux bison (Fig. 28) with wounds and arrows. To judge from the masked figures depicted on the cave walls at Teyjat and Trois Frères (Fig. 29), dances, in which men assumed the guise of game animals, played an important rôle.

It is natural that the sun should have been the object of devotion among agricultural peoples, particularly among those living in marginal regions and lacking accumulated stores ; a few days of sunshine might make all the difference between the success and failure of the harvest, and under such conditions

failure might have calamitous consequences. The occurrence on the Late Bronze Age rock-engravings of Bohuslän of solar

[*After Breuil*

FIG. 29

The sorcerer at Trois Frères, Ariège, France

symbols side by side with plough scenes is most suggestive. From an earlier stage of the Bronze Age we have the famous sun-car from the bog of Trundholm in northern Zealand,

with its gilded disc mounted on a six-wheeled bronze carriage drawn by a horse, a symbol of the sun being drawn across the sky. It is significant also that solar symbols are frequently found with ship symbols and birds on the bronze razors of the north. Shaving and its converse frequently have a religious signification even at the present day : contrast the shaven pope and cardinals of Rome with the bishops and patriarchs of the Orthodox Church.

Curative springs seem to have been the object of veneration in the Bronze Age as also to-day. Votive offerings of bronzes have been found in medicinal springs in Denmark, Switzerland, France and Italy, frequently at the foot of primitive wells formed of hollowed tree trunks. Votive offerings for which there seems to be no special explanation are a common feature of North European bogs : the find from Grunty Fen, near Ely, described in Chapter II (p. 20), is typical of its kind. The tapered locks of hair found at the Late Bronze Age level in Jutish bogs call to mind that the practice once obtained in ancient Greece of youths dedicating their locks to a river-god. Although it would be unwise to press the analogy, one can certainly say that among primitive peoples the world over, great power is thought to reside in human hair, which for this reason is considered an offering acceptable to the gods.

Finally, a word must be said on burial customs and their relevance to ideas on death. The provision of grave goods, implying a future life similar to that lived on earth, can be traced away back to the Mousterian burial of La Chapelle-aux-Saintes. It is a far cry from the flints placed by the Neanderthal man to the richly equipped burials of the nomad peoples of Asia described in an earlier chapter (p. 75), but the idea is fundamentally the same. Sometimes, indeed, the provision of comfort for the great man in the life to come went so far as to involve human sacrifice. Listen to Woolley's description of one of the royal graves of Ur :

Britain was that of 500,000 put forward by R. G. Collingwood [1]; but this has been contested by Wheeler,[2] who has suggested a figure as high as 1,500,000. That experts of this calibre should differ to this extent shows how ignorant we are of the basic conditions of life as it was lived in Britain at a period from which we possess so formidable a mass of museum paraphernalia.

Recent discoveries have, however, done something to clarify the situation. It is now considered by some researchers [3] that, while the old prehistoric 'scratch agriculture' persisted on light soils, a more advanced economy was practised on clay soils in connection with the villas, on the estates of which strip fields are thought to have been ploughed by heavy ploughs with coulter and mould-board. As there were anything from 500 to 1,000 villas, some of them with estates of 1,000 acres, this would have had a profound effect: it would mean that richer soils were cultivated by better methods and that in consequence a large amount of food would be produced by a relatively small number of people. The new conception of villa agriculture, in fact, helps to explain how the province was able to maintain a large non-producing population and at the same time dispose of an export surplus, without, like Wheeler, invoking a total population substantially larger than Collingwood's original estimate. The recent discovery of an extensive area of Romano-British cultivation in the rich silt fens of North Cambridgeshire and South Lincolnshire is another factor of which account must be taken. Altogether we may hazard that the population of Roman Britain was round about 600,000 or 700,000. A

[1] *Antiquity*, 1929, 261–76.

[2] *Ibid.*, 1930, 91 ff.

[3] C. A. Ralegh Radford, 'The Roman Villa at Ditchley', *Oxoniensia*, I (1936), 24–69; and E. Barger, 'The Present Position of Studies in English Field-Systems', *The English Historical Review*, 1938, 385–411.

doubling of this total between the Occupation and the Norman Conquest does not seem excessive, if account is taken of the numerous immigrations, of the more widespread adoption of the heavy plough and of the extensive clearing of forest during the intervening centuries.

In trying to arrive at an estimate for Belgic Britain one is entitled to make substantial reductions on this figure. The cultivation of the silt land of the Fens is known to have been a Roman innovation. Then it seems reasonable to make some allowance for improvements in the distribution of produce made possible by improved political conditions and vastly better means of communication. When allowance is further made for natural increase of population resulting from the economic innovations brought in by the Belgae, it seems reasonable to think in terms of 400,000 or so as a peak figure for Prehistoric Britain.

What of a lower limit for prehistoric times? To go no further back than the last major glaciation, it seems reasonable to turn to the sub-arctic regions of North America for comparative data, for here peoples are still living under conditions, both cultural and environmental, which resemble those of Upper Palaeolithic Europe. Density of population in the extreme north of America varies within wide limits: in Alaska there were at the time of its cession to the United States in 1867 some 20,000 natives to an area of 590,884 square miles, but the 1,309,500 square miles of the North West Territories contained in 1911 only 6,507 persons all told.[1] Although it is true that these figures give us a range of density of from 30 to 200 square miles per person, the population they imply is in any case sufficiently sparse. One is forcibly reminded of that late eighteenth-century writer who said of another part of North America, 'there are very few Californ-

[1] Statistics taken from the *Encyclopaedia Britannica*, 14th edtn., vol. I, 501, and vol. 4, 694.

ians, and in proportion to the extent of the country, almost as few as if there were none at all. . . . A person may travel in different parts four and more days without seeing a single human being.' [1] Applied to England and Wales the figures for Alaska and the North West Territories would give a maximum population of 2,000 and a minimum of 250. In deciding whereabouts within this range to arrive at a settled figure it is essential to realize that during Upper Palaeolithic times Britain was on the very fringe of the habitable world. Personally, I incline to 250 for the winter months.

This may seem unduly low, but it is well supported by the actual findings of archaeology. Of the eighteen inhabited caves and rock-shelters listed by Miss Garrod [2] most were small ones, and for none do we need postulate more than a family group. Moreover, the traces of occupation found in them were with few exceptions scanty in the extreme. Further, their occupation has to be spread over a long period and it seems unlikely that more than a few were inhabited at any one time. It may be that there are more shelters to be discovered, but the evidence does not suggest that these are numerous : four of Miss Garrod's sites were investigated for the first time prior to 1830 and only four since 1875. The one serious uncertainty relates to south-eastern Britain, where in default of natural shelters, artificial winter-houses may have been built. But an estimate of 250 leaves a margin sufficient to discount this possibility. Next time you are caught in a London traffic jam it may amuse you to reflect that the entire population of Britain during Upper Palaeolithic times could have been comfortably accommodated in four or five buses.

Just what was the effect of more temperate conditions is difficult to assess, although it must in this part of the world have tended to make life easier for food-gathering peoples.

[1] Krzywicki, *Primitive Society and its Vital Statistics*, 2. London, 1934.
[2] D. A. E. Garrod, *The Upper Palaeolithic Age in Britain*. Oxford, 1926.

Still, the maximum population we ought to allow for Mesolithic England and Wales can hardly have exceeded 3,000–4,000. The sparseness of the population is borne out by the smallness of social groups as shown by settlement sites. Conditions must have been somewhat similar to those which obtained in Tasmania at the time of Captain Cook's visit. One of his companions wrote that there 'never were more than three or four huts found in a place, and these capable of containing 3–4 persons each only.'[1] This description might have been applied to the Pennine Mesolithic sites.

On the estimates already advanced it would seem that the population expanded approximately a hundred-fold between Mesolithic and Belgic times. This compares with the similar increase which took place in the shorter, and in some ways less revolutionary, period between Belgic and modern times.

In trying to arrive at figures for different stages of prehistory in the intervening period close ethnographic parallels are no longer available. Nevertheless general economic considerations give us some clues.

The introduction by our Neolithic settlers of the arts of food-production must have made for a rapid increase in numbers. But it is essential to realise that, to borrow the words of a recent writer,[2] in Neolithic times 'the main business of life was the rearing of cattle, sheep, goats, and pigs; the cultivation of corn was merely an adjunct.' And so it remained in Britain until the Late Bronze Age. The increase of population that we have to allow on account of the invasions of beaker-using peoples at the end of Neolithic times and of sundry infiltrations during the earlier part of the Bronze Age, may have tended to favour agriculture at the expense of pastoralism, although there is little evidence for this. Indeed, the tendency seems to have been to develop hunting, which

[1] L. Krzywicki, *op. cit.*, 5.

[2] E. C. Curwen, *The Archaeology of Sussex*, 89. London, 1937.

with improved methods may have added substantially to the food-supply. Further, it must be remembered that during prehistoric times immense tracts of claylands at present thickly settled were virtually uninhabited. If 20,000 be taken as a round figure for Neolithic times, with an upper limit of 30,000–40,000 for the Middle Bronze Age, we should probably not be far wide of the mark.

Such tentative estimates as have been based on actual archaeological material, after making due allowance for the incompleteness of the evidence, favour low figures. Assuming as most people do, that megalithic chamber graves were the burial places of whole communities and not merely of a certain stratum of society, Professor Childe has estimated the Neolithic population of Caithness at something between 300 and 400 souls. Yet Caithness is one of the densest regions for megalithic tombs in Scotland. No less telling is his suggestion of 2,500 as a possible average for the Mainland of Scotland during the Early Bronze Age.[1]

But what, it may be asked, of the megalithic tombs and 'henges' of early Britain? Does not their construction entail a population larger than you would allow? Certainly they imply an ability to organize and concentrate labour far transcending anything conceivable under a food-gathering economy. On the other hand, to maintain that they imply a dense population would, to my mind, be mistaken. It has to be remembered that the tombs, having once been built, served a number of generations, and that the 'henges' were the product of gradual growth: in no sense can such structures be regarded as a normal output of society. Further, as we are reminded by the Arabs and the Semites, a pastoral economy, while incapable of supporting a dense population, is able to afford leisure for meditation on a scale unattainable under the burdensome conditions of primitive peasant agriculture. In

[1] *Prehistory of Scotland*, 55–6 and 122. London, 1935.

this connexion it is surely significant that the great funerary and sacred monuments of prehistoric Europe date predominantly from the Neolithic period or the earlier stages of the Bronze Age. Nor can it escape attention that Avebury and Stonehenge are both in the midst of the richest grazing grounds of prehistoric Britain.

The introduction of the plough and the establishment of settled agriculture, in conjunction with successive waves of immigration, must have added substantially to the population which already before the arrival of the Belgae may have mounted to something in the region of a quarter of a million.

The Belgic invasions were admittedly confined to little more than a sixth of England and Wales, but this sixth was potentially a very rich one. It is significant that the Belgic cultivation of the loam terrains with the heavy wheeled plough not only increased substantially the total population of the country, but also brought about a shift in its centre of gravity comparable with what occurred between 1760 and 1830. Wessex lost its predominance to the counties bordering the estuary of the Thames.

Another way in which population must have varied is in its age composition. In early times the expectation of life was short, marriage took place at an early age and the generations followed each other rapidly. By studying skeletal remains, concentrating in the case of adolescents on the stage reached in the eruption of the teeth and the degree of fusion attained by the epiphyses of the long bones, and in that of adults on the sutures of the skull, it is quite easy to establish the ages at which individuals within certain specified groups died. An idea of the results obtained by Professor H. V. Vallois [1] for various European groups is given in the following table:

[1] *L'Anthropologie*, 1937, 499–532.

	0–14 years	14–20 years	21–40 years	41–60 years	Over 60 years
Neanderthal man (20) .	40	15	40	5	—
Upper Palaeolithic man (102)	24·5	9·8	53·9	11·8	—
Mesolithic man (65) .	30·8	6·2	58·5	3	1·5
Early Bronze Age Cemetery, Austria (273) .	7·9	17·2	39·9	28·6	7·3
Lower Austria in 1829 .	50·7	3·3	12·1	12·8	21
Austria in 1927 . . .	15·4	2·7	11·9	22·6	47·4

N.B.—For the prehistoric groups the numbers of subjects are shown in brackets. Results are expressed as percentages.

The effect of settled life is brought out by comparing the figures for Early Bronze Age Austria with those for the three groups of European food-gatherers. The rapid improvement during the last hundred years reflects the unprecedented progress of medical science. It will be observed that, whereas the proportion of people surviving to the age of sixty or more has increased a hundred-fold since the food-gathering stage, the increase between the Early Bronze Age and modern times has only been seven-fold, and half this has occurred during the last hundred years.

SOCIAL ORGANIZATION AND BEHAVIOUR

Fully to understand the functioning of a society it is essential to be acquainted intimately with its structure and organization. This is a proposition which has only to be stated for the limitations of archaeological research to become painfully apparent. It is nevertheless a true one. After years of experience in the field, living among a people as one of themselves, the ablest anthropologist only succeeds in reaching a

partial understanding of their culture. If proof of this were needed it can surely be found in the controversies which divide the world of anthropological research. But if in studying a living society it is only possible to see as through a glass darkly, how much more difficult is it to understand the workings of an extinct one. Even when a society has left behind it a great and revealing literature the difficulties are still immense. Ancient Greece has been studied by generations of the most renowned scholars backed by an overwhelming proportion of the academic endowments of the entire Western world: yet classical scholars would be the last to claim that their task was finished. For prehistoric times both the personal and the literary bridges are missing, and understanding has to depend on inference eked out by a cautious use of comparative material from still living societies. All the warnings uttered earlier in this chapter about the dangers of applying ethnographic parellels indiscriminately to archaeological material may here be repeated with double emphasis.

Family life, marriage customs and family relationships are matters which can hardly be inferred directly from archaeological material. The size of the normal social group, on the other hand, can be established with fair accuracy if settlement sites are excavated in their entirety. Until recent times, however, archaeologists have been preoccupied so much with stratigraphical and typological studies that settlement archaeology has only rarely been developed with a view to throwing light on social conditions. Such results as there are already to hand are suggestive. For instance Francis Buckley found that the Mesolithic people of the Pennines moved about either in single families, or in small groups with perhaps four huts, each accommodating between three and five people. The Neolithic hoe-agriculturists of central Europe and the Rhineland lived in somewhat larger groups, although the well-known settlement at Köln-Lindenthal never accommodated more

than 250 to 300 people and was sometimes down to 50 to 80.

Analogies with modern primitive peoples suggest that the relatively small groups of ordinary life were probably united at certain seasons of the year, when food was abundant. At such times amid unaccustomed plenty the tribe gloried in an uncommon sense of social solidarity. Thus, although the normal size of social groups among the Tasmanians ranged from ten to fifteen, they seem nevertheless to have been united in tribes of something like a thousand each. Possibly the Mesolithic people of Britain were united in four or five such tribes, and, perhaps, when regional variations of culture have been more closely defined we shall be able to distinguish their territories. In Neolithic times and during the Bronze Age the size of the tribes must have been greater and possibly Avebury and the other great henges served for tribal gatherings. But before more is known the larger social groupings must remain obscure until we meet them on the threshold of history. Only with the minting of coins by Belgic princes in the first century B.C. is it yet possible to say anything definite of the political organization of southern Britain. Possibly the study of boundary dykes may help us in some parts of the country.

Much can be learnt about the economic structure of society from a study of land tenure and of property rights. This, in turn, is closely connected with systems of cultivation and types of settlement. Investigations of ancient field-systems and their attendant farmsteads offer most promising subjects of enquiry in which good work has already been done, especially in England and Jutland.

The existence of different grades of society can safely be inferred from outstandingly rich burials, from emblems of authority and from the presence of individual houses of outstanding size or equipment. Sometimes it can be shown from the elements of their material culture that the overlords were

of foreign origin, a diagnosis which would receive support if the individuals concerned could be shown to be of distinctive physical type. But, although there are more possibilities in this direction than are generally appreciated, there are definite limits to the amount of information we can hope to obtain on this subject.

Finally, there are whole realms of social behaviour about which it is extremely difficult to obtain definite information by archaeological methods, although easy enough to indulge in airy speculation. The well-known paintings in the cave of Gargas in the Hautes Pyrénées, showing negative silhouettes of human hands, many of them lacking fingers, are a case in point. Some people have not hesitated to claim that they imply mutilation of a type known among certain modern primitive peoples. This may be, but there is an alternative explanation which many people consider fits the evidence better, namely that the patterns were made by painting round hands perfectly complete but with certain fingers folded.

The most one can really do in cases of this kind is to supply an explanation based on ethnological experience which appears to be consistent with the facts. Often it happens that more than one explanation will fit equally well. Only when the coincidences are sufficiently numerous and well defined can any single explanation be accepted as the correct one, and then only with inevitable reservations.

Take cannibalism as a further example. The discovery of odd human bones on a site is obviously insufficient as evidence of this habit, since there are plenty of sound alternative explanations. Where, on the other hand, human bones are found mixed indiscriminately with animal meat bones, having further been split and broken open for the extraction of marrow, the inference is inescapable that they are the product of a cannibal feast. No certain evidence is forthcoming for Palaeolithic or Mesolithic times in Europe, but cannibalism

seems to have been an established practice among some Neolithic communities. Most convincing is a recent find in the Hohlestein, a cave in the Lonetal near Ulm. Here in a depression the excavator, Dr. Otto Völzing, came upon the bones of at least thirty-eight individuals, almost every one of them broken up for marrow extraction and intermingled with Neolithic (Rössen) sherds, worked flints and remains of horse, pig and cattle, the whole being overlain by a large hearth.[1] The fact that the bones were predominantly those of children only serves to confirm our diagnosis. Almost identical circumstances were observed in the Istállóköer cave in the Bükk mountains of northern Hungary, where the remains of twenty-five persons were also found under a large hearth, accompanied by Neolithic artefacts. The presence among the cooking refuse of some of the Swiss lake-villages of human bones split for the extraction of marrow emphasizes the existence of cannibalism in this part of Europe during Neolithic times.[2] How long it survived is not yet established, but there is good evidence for the practice in Bohemia and Austria during the Late Bronze Age.[3]

What makes the Lonetal find all the more interesting is that the same cave produced from a Mesolithic level skull burials of a type previously established for this period by the Bavarian finds of Ofnet and Kaufertsberg. The circumstances of these finds strongly suggest head-hunting. In the cave at Ofnet two nests of skulls were found, one of twenty-seven, the other of six. To quote Obermaier:

> All the skulls were placed facing westward, and with each was its lower jaw and one or more of the cervical (neck) vertebrae. Some of these vertebrae bore evident marks of cutting, showing that after death the head had been separated from the trunk.

[1] *Fundberichte aus Schwaben*, N.F., IX (1938), 1–7.
[2] V. G. Childe, *The Danube in Prehistory*, 170. Oxford, 1929.
[3] *Ibid.*, pp. 344–5.

The sepulture of these heads did not take place all at the same time, but successively and by degrees, as is shown by the fact that the skulls at the centre of the circle are all crushed or distorted while those near the edge of the circle are intact.[1]

According to Hutton the Naga hill tribes of Assam made no discrimination of age or sex when head-hunting.[2] Being easier to secure, the heads of women and children were naturally more often taken than those of men. Women's heads were also preferred because they yielded more long hair with which the successful hunter could garnish his insignia. This tallies well with the fact that of the skulls at Ofnet no less than twenty were those of children, while of the thirteen adults only four were males. The disposal of skulls obtained by head-hunting seems to have varied widely among modern primitive peoples. Among the Kayans and Kenyahs of Borneo they were strung up in their houses. In Assam the Sema Nagas hung them from trees, but the Angamis buried them face downwards. This only goes to illustrate once again the necessary incompleteness of archaeological evidence, since it is only among peoples who buried their trophies that any evidence of head-hunting could survive.

The evidence for head-hunting and cannibalism in southern Germany is all the more consistent in that it derives from successive periods of prehistory, since where these practices have been observed in modern times they are usually found, together with human sacrifice, to be mutually exclusive.

If this chapter has done something to dispel complacency and expose the bareness of the land it will have served its purpose, for until prehistorians learn to appreciate their situation at its true worth archaeology cannot develop as it ought. Although always ready to proclaim the youthfulness and

[1] H. Obermaier, *Fossil Man in Spain*, 337. Yale, 1925.
[2] J. H. Hutton, *The Angami Nagas*, 156–7. London, 1921.

vitality of their subject, prehistorians are sometimes prone to behave as though it was mature. It may be true that for some areas, notably parts of Europe, many of the bones of prehistory have been collected ; but these not only stand almost bare of flesh—most of them lie in disarticulate heaps. The hard and more or less imperishable fossils of human culture, although they may look imposing arranged in museum cases or catalogued and illustrated in text-books, have of themselves little more significance than a collection of postage stamps. As indices of material culture they have meaning only in relation to what has perished, and material culture has meaning only in relation to society.

CHAPTER VII

ARCHAEOLOGY AND SOCIETY

'*The Antiquary . . . will never be deemed an unserviceable member of the community whilst curiosity or the love of truth subsists; and least of all, in an age wherein every part of science is advancing to perfection. . . .*'

Introduction to *Archaeologia*, Vol. I, 1770.

'*The one and only thing that matters to us, and the thing these people are paid for by the state, is to have ideas of history that strengthen our people in their necessary national pride. . . .*'

Attributed to HEINRICH HIMMLER.[1]

IF archaeology be accepted as a social study in the sense that it is concerned with reconstituting and interpreting ancient society, it may well be asked what relation this has to life in our own day. To what extent, and how, can archaeology subserve a social purpose? In a society such as that which gave birth to *Archaeologia*, a society dominated by the cultured few, to whom the value of knowledge for its own sake was self-evident, such questions would have no meaning. To-day, when social utility tends to be conceived of in terms of the material well-being of the masses, they are relevant in the most practical sense.

The collectivist trend of modern society has inevitably affected, more than in the case of most pursuits, the prospects of archaeology, linked as this is so closely with the utilization of the soil on which the monuments of antiquity stand and

[1] H. Rauschning, *Hitler speaks: a series of Political Conversations with Adolph Hitler on his real aims*, p. 225. London, 1939.

which incorporates so much of the material evidence. If in the past, archaeological studies had only to retain the goodwill of a landed interest versed in an appreciation of antiquity, to-day it is needful to secure the suffrages of public authorities representing the interests of citizens at large. From the very nature of things it must often happen that, in a densely populated island faced with a crisis of physical reconstruction, the claims of antiquity will clash with those of present-day requirements. While much can be effected by an understanding administration of comprehensive antiquities' laws, it has to be remembered that in a democratic society these laws themselves rest ultimately upon acceptance by the common man. If society, as it exists to-day in the west, is to be reconciled to limitation of material satisfactions in the interests of antiquity, it needs to be convinced that something more is at stake than gratifying the tastes of a numerically insignificant minority of private individuals. But this is by no means all. It is not merely that the survival of archaeological sites in many areas depends upon the forbearance of contemporary society : the active prosecution of archaeological research is in itself a costly affair. In this regard the altered distribution of wealth makes itself felt with double severity. Inflation and the diversion of income from private to communal ends by means of taxation have hit most heavily the educated classes upon which archaeology has hitherto relied for support, at a time when the wages of manual labourers, a main cost of excavation, have risen steeply.

Both problems have been aggravated by the development of the subject itself. The days are past when it was considered enough to excavate burial mounds by central shafts or hill-forts by cutting sections or clearing a few rubbish-pits : to gain real insight into the social life of prehistoric peoples it is necessary to examine entire barrow-groups and to uncover complete settlements. Obviously, this is likely to involve

greater interference with the plans and day-to-day activities of the community and to call for a greater diversion of economic forces than excavation in the old style. Thus the very progress of archaeological studies has only made it more desirable to formulate their social function, or, at least, to indicate what benefits society may hope to derive from the cultivation of a subject devoid of any obvious material applications.

At bottom, archaeology's strongest claim on the community rests on its ability to foster sentiments needful to the stability and, indeed, to the very existence of society. In this, as in so many respects, it is complementary to written history: by studying material objects archaeologists are able to enrich knowledge even of those periods best illumined by documents, and, in so far as they can recover and interpret indications of the prehistoric past, to set history itself in a new perspective. Archaeology thus multiplies and strengthens the links which bind us to the past, and provides innumerable material symbols of social development through the ages, symbols all the more effective because visible and tangible. At the same time, since the material studied by archaeologists is rooted in the soil, archaeology helps to foster a sense of community among those who for long ages past have inhabited the same territory. In a word, archaeology helps to promote those feelings of solidarity on which social obligations are based, and without which it is difficult to imagine the continuance of ordered society. There can be no doubt that archaeology owes much of its appeal to its power of satisfying sentiments based in the final analysis on the primitive herd instincts, which nevertheless underlie human society.

It is no accident that the rise of archaeological studies should have been associated intimately with growth of national sentiment, and in this respect such books as Camden's *Britannia* (1587), Cluver's *Germania* (1615) or Rudbeck's *Atlanticae sive Mannheimii* (1675–98) are of interest alike to the historian of

antiquarian studies and of national feeling. The pragmatic value of archaeology was, indeed, realized at an early date by those whose task it was to guide the destinies of national states. It is noteworthy how, from the time of the Reformation down to the present day, the study has been patronized by heads of states. If Henry VIII's appointment of Leland as King's Antiquary was practical, not to say predatory in intent, the same could hardly be said of the foundation by Gustavus Adolphus of Sweden (1594–1632) of the still active office of Antiquary of the Realm, of James I's concern with Stonehenge [1] or of the gracious patronage extended by later monarchs and presidents to the academies, societies and other institutions devoted to the study of antiquity.

In our own day the Irish Free State Government has systematically encouraged archaeological research, while at the same time reviving Erse, seeking by these means to focus attention on the prehistoric past when the land was free. Among the principal measures has been the introduction of foreign specialists, an Austrian to direct the National Museum of Antiquities, a Danish scientist to investigate the bogs [2] and American archaeologists to undertake excavations,[3] but the Free State Government has also taken steps to develop indigenous archaeology: it has devised methods for protecting ancient monuments, it has prohibited the illicit export of

[1] It was by King James' direction that Inigo Jones made the study of Stonehenge embodied in his *The Antiquities of Stone-Heng on Salisbury-Plain Restored*, published posthumously in 1655.

[2] Dr. Knud Jessen, the distinguished Danish palaeo-botanist, was invited to Ireland in 1934 to advance research on the Irish bogs and undertook fieldwork in that and the following year.

[3] The Harvard Irish Survey, a research programme of the Division of Anthropology of Harvard University, was launched in 1931 to undertake research in archaeology, social anthropology and physical anthropology. In order to further archaeological research, expeditions were sent to Ireland each summer from 1932 to 1936 to undertake excavations.

antiquities, it has created chairs in the universities, it has trained native assistants of the National Museum, it has financed excavations under relief schemes and it has subsidized the publication of results. The outcome has been a splendid outburst of archaeological activity, flattering to the prestige of the country in the civilized world and, at home, stimulating those deep-seated feelings of attachment to the country's past which make for national unity and heighten the sense of national consciousness.

The progress of archaeological studies among the nations of eastern and central Europe, which achieved or temporarily regained independence after the First World War, is also instructive. In the case of Esthonia, to take one instance, archaeological activity which, under the auspices of the *Gelehrten Estnischen Gesellschaft*, had already been pursued while the country still formed a part of Tsarist Russia, was immensely stimulated by the achievement of independence and at the same time was pursued all the more keenly thanks to its power to quicken national sentiment: the Esthonians found that they experienced a heightened sense of solidarity and national identity as they explored the prehistory of their land and people.[1] The Finns, also, who in Tsarist days had known not to neglect the resources of antiquity in the struggle to maintain their identity, continued under more spacious circumstances to explore the Finno-Ougrian past, and made of their Museum of Antiquities at Helsinki a fitting monument, something of which her people can be proud without others feeling the poorer. Again, during the period of regained independence the Poles helped to heal the wounds of cruel partitions in historic times by identifying distinctively Polish features in

[1] Professor H. Moora's great work *Die Eisenzeit in Lettland bis etwa 500 N.Chr.*, published at Tartu in 1938, to quote one instance, transcends in thoroughness any work on any single phase of British prehistory.

the prehistoric cultures of their land,[1] and it is significant that during the Second World War the Nazi conquerors exterminated national monuments and collections as eagerly as military works. It is interesting to note also how the late President Masaryk interested himself in the prehistoric archaeology of his beloved Czechoslovakia.[2] On the other hand, the Hungarians, deposed from partnership in an extensive empire, found compensation in their free, if reduced, patrimony and laboured to unravel the prehistory of their land. Again, it is only since Turkey emerged in her modern guise as a national state centred on the Anatolian mainland that she has made the first signs of interesting herself in her prehistoric past: the enthusiasm of the Ghazi sometimes took an embarrassing turn, but at least it showed awareness of the virtues of antiquity as a factor in the integration of a nation.

Farther afield the interaction of national awakening and archaeological research can be observed on a gigantic scale in China. For generations this great land had been the despair of archaeologists. The demand for antiquities both in China itself and from the outside world was satisfied by illicit robbing of ancient sites and plundering of tombs. Regular excavations were inhibited by a deep-seated antipathy to extensive digging, which was thought to be unpropitious, likely to jar the susceptibilities of the spirits and generally disturbing to the magical influences of the region. Thus, while a steady stream of objects poured into the cabinets of museums and private collectors the world over, information as to their associations and finding-places was either lacking or at best

[1] Among Polish prehistorians to achieve a European reputation between the two wars were L. Kozłowski, J. Kostrzewski, W. Antoniewicz and L. Sawicki.

[2] It was the President's support, for example, which made possible the extensive excavations carried out by Prof. K. Absolon on the world-famous mammoth-hunters' station at Předmost.

deficient. Any attempt to work in the field would be met by passive resistance from the peasant cultivators fearful for the fertility of their soil, and by the active antagonism of armed bands, who controlled the 'racket' in antiquities at its source and guarded information as to ancient sites as trade secrets.

The action taken by the leaders of modern China to remedy this state of affairs has been partly direct, partly indirect. The process of Westernization pursued as a general policy has of itself reduced opposition to archaeological excavation, even among the peasants, by undermining the whole system of beliefs centring round ancestor-worship. Positive action has included official bans on unauthorized digging and the provision where necessary of armed escorts for scientific expeditions. Since the country has been opened up, many discoveries have been made by Western scholars. The original discovery of palaeolithic remains in China was made on the edge of the Ordos desert in 1923 by two French Jesuits, Teilhard de Chardin and Emile Licent; the discovery of the world-famous bone deposits at Chou K'ou Tien near Pekin fell to a Swede, Dr. Gunner Andersson, while acting as Mining Adviser to the Chinese Government, and the recognition of a new fossil hominid, *Sinanthropus Pekinensis*, was due to an American, Dr. Davidson Black; and, again, it was Dr. Andersson who first pointed out the significance of the painted pottery of Honan and Kansu which did so much to stimulate research on the neolithic cultures of north China. Yet, even from the beginning, China herself played an essential rôle in the unveiling of her own distant past. Much of the onerous fieldwork was carried out by the National Geological Survey of China and by the Official National Research Institute, and from the first the new discoveries have been published in Chinese periodicals, such as the *Bulletin*, *Memoirs* and *Palaeontologia Sinica* of the Geological Survey. In addition there is already a rising school of Chinese researchers in the

field, of whom it may be sufficient to mention Dr. W. C. Pei, collaborator in the discovery of *Sinanthropus* and his industrial remains, and Dr. Li Chi, excavator of the Bronze Age city of Anyang. It has been recognized by the leaders of modern China and not least by Chiang-Kai-shek, that in the antiquity of her culture lies one of her greatest moral assets, at once a focus of national solidarity and a talisman of international sympathy.

Unfortunately, State authorities have not always stopped short at encouraging archaeological research ; in totalitarian lands the subject has been deliberately harnessed to subserve the aims of the State without any necessary regard to objective truth. Under the Fascist regimes of both Germany and Italy, the very emblems of which, the swastika and fasces, were derived from antiquity, archaeology has been exploited to subserve odious and predatory aims. In preparing the Italian people to die for glory, Mussolini drew heavily on the credit of the Roman Empire. Excavations, exhibitions and flamboyant, if calculated, gestures were lavished to awaken in the Italian people a memory of their imperial past. The patronage of archaeology by the Fascist State was related primarily to political ends and only incidentally to scholarship. This is not to say that no benefits accrued to archaeology. For instance, when in the course of clearance a line of temples was revealed on the Largo Argentina in Rome, projected office-buildings were vetoed so that the monuments might be preserved.[1] Excavations were timed to coincide with the anniversary of the birthday of the city of Rome and the temples were left standing in the heart of the business quarter as mute reminders that Rome was great even prior to the First Empire. Sometimes elaborate excavations were undertaken as little more than stunts. The recovery of Caligula's house-boats by the draining of Lake Nemi involved an effort dispro-

[1] *Illustrated London News*, 4th May, 1929, 769.

portionate to the benefit to learning, since most of the movable finds had been salvaged previously, notably in 1895 ; but, of course, scholarship was hardly what Mussolini had in mind when on 20th October, 1928, he personally set in motion the electric pumps. The gesture was calculated solely to impress the public imagination. If the archaeological results were dearly bought, it was at least possible for the Minister of Education to rise in the Italian Senate and claim the hulks as testimony to the skill in naval construction of the ancient Romans ![1]

Considered as measures of propaganda, some of the Duce's efforts, such as the cutting of the Via dell' Impero from the Piazza Venezia to the Coliseum, were masterpieces of their kind : inaugurated to celebrate the tenth year of Fascism on 5th November, 1932, this great processional way is flanked by some of the finest monuments of classical antiquity—the fora of Trajan, Augustus and Nerva on one side, the forum of Julius Caesar, the old Roman curia, the temple of Antoninus and Faustina and the basilica of Constantine on the other. It is as though the monuments of ancient Rome had been unveiled to stand as silent witnesses to the pomp of the pinchbeck Second Empire ! To drive home the moral, Mussolini set four great marble maps into the outer walls of the basilica of Constantine portraying dramatically the growth of the Roman Empire from the city state of the eighth century B.C. to its maximum extent under the Emperor Trajan (A.D. 98–117). To the original series, unveiled in the midst of the Abyssinian War,[2] a fifth was added in due course, displaying the Empire of Fascist Italy in the fourteenth year of the era.

A similar motive activated the exhibition opened on 23rd September, 1937, ostensibly to commemorate the bi-millenary of the birth of Augustus. Among a visitor's first impressions was the sight of two soldiers, dressed in ' colonial ' uniform and wearing pith sun-helmets, who paraded in excusably bored

[1] *Ibid.*, 29th July, 1929, 155. [2] *Ibid.*, 21st December, 1935, 459.

fashion the broad flight of steps that gave access to the building. Over the main entrance was carved in high relief the following quotation from Mussolini: '*Italiani fate che le glorie del passato siano superate dalle glorie dell' avenire.*' To emphasize the lesson an animated map, on which stages of growth were indicated by illumination, demonstrated the enlargement of the Empire: from the single bright spot of Rome one could observe the spread of light in six successive stages, marking the extent of territory at the beginning and end of the Punic Wars, at the coming and death of Caesar, at the death of Augustus and at the death of Trajan. The observer waited in vain who hoped to see unfolded successive stages in the decline and disintegration of the Empire: the lights went out abruptly and the process of growth began anew.

It was surely no accident that the Nazi regime in Germany should have encouraged archaeological activities in the Reich. In the ingenuous phrases of Prof. Hermann Schneider of the University of Tübingen: [1]

> The year 1933 witnessed the victory of an attitude towards the history of the culture of Germany which gave to the Germanic element of all that is German a significance previously unthought of. 'The best of what is German', it was declared, 'is Germanic and must be found in purer form in early Germanic times.' Archaeological research thus found itself faced with the pleasant task of examining and reconstructing the real essence of Germanic life and customs.[2]

For the accomplishment of their congenial task German prehistorians were endowed with prodigality; labour and money were made available for excavation, publication was subsidized, new museums built and regional antiquities departments organized. Some idea of the scale of activity is given by the circumstance that in 1939 courses in prehistoric archaeology

[1] *Research and Progress*, 1939, 135. [2] Translation.

were scheduled for no less than twenty-five German universities. As a result of lavish support from the State, prehistoric studies made striking progress in Nazi Germany, but this technical progress was dearly bought. The subsidies were not paid out of any high-minded devotion to learning, but to serve the purposes of the regime : no less a comrade than Heinrich Himmler appears to have satisfied himself that ' prehistory is the doctrine of the eminence of the Germans at the dawn of civilization '.[1] In all essentials the Nazis followed the path marked out by the pan-Germans : the basic theory upon which both operated was that noble qualities and high culture have ever been identified with Germans, who thereby inherit the obligation to multiply and expand to the utmost limits compatible with the maintenance of their racial and cultural homogeneity. Obviously, proof of the premise could only be forthcoming if the history of Germanic culture was first established back to its origins. Money spent on archaeology would not be wasted, if archaeology could supply the evidence of German ' superiority ' at all times.

The first scholar to appreciate the possibilities of prehistoric archaeology from this point of view was Gustaf Kossinna (1858–1931). Kossinna was trained as a philologist and it was not until 1895 that he delivered his famous lecture at Cassel defining his point of view. Seven years later he was appointed first professor of German prehistory at the University of Berlin, a chair which he continued to occupy down to the time of his death. To begin with he had to face considerable opposition among his colleagues in the university and it is piquant in view of the famous Rome-Berlin ' axis ' of later years to recall that he found his worst enemies in the ranks of the classical archaeologists and historians.[2] We find him

[1] H. Rauschning, *op. cit.*, 225.

[2] G. Kossinna, *Die deutsche Vorgeschichte eine hervorragend nationale Wissenschaft*, 2–3, and 83. Leipzig, 1912.

attacking the lack of patriotism of men wont to represent the Germans of antiquity as poverty-stricken barbarians ravening on the fringe of the opulent and highly civilized classical world. His complaint that the general administration of the Royal Prussian Museums ranked the museum of German prehistory and ethnology below the collections illustrating Hottentot and Papuan life was bitter, and equally sharp was his resentment that German prehistory should be ignored by the Berlin Academy of Sciences, which welcomed representatives of Greek, Roman, Egyptian and even Oriental archaeology. It was in some degree this sense of inferiority which made him so plangent in his claims for German prehistory and so intolerant of virtue in other peoples than the Germans.

Kossinna cherished as fundamental the opinion which he quoted from the writings of the historian Sybel, that 'a nation which fails to keep in living touch with its past is as near to drying up as a tree with severed roots. We are to-day, what we were yesterday.' [1] Unfortunately Kossinna seems to have been incapable of investigating the past with scientific detachment. His aim appears to have been to demonstrate at whatever cost the 'superiority' of the Germans at all times over the other peoples with whom they came into contact. His favourite method was so to inflate the chronology of German prehistory that any innovation deemed of sufficient note could easily be shown to be of Germanic origin, its diffusion being due to Germanic domination of 'inferior' peoples. He felt no qualms in recognizing 'more than a dozen colonizing spreads of the megalith-Indogermans from the North over the whole of Central Europe as far as the

[1] 'Eine Nation, die nicht den lebendigen Zusammenhang mit ihrem Ursprung bewahrt, ist dem Verdorren nahe, so sicher wie ein Baum, den man von seinen Wurzeln getrennt hat. Wir sind heute noch, was wir gestern waren'—quoted by Kossinna in his book *Ursprung und Verbreitung der Germanen in vor- und frühgeschichtlicher Zeit*, I. Leipzig, 1926.

Black Sea' in Neolithic times alone.[1] His learned papers teem with digressions, all having the same end in view. He hails the splendid bronze trumpets of the Nordic Bronze Age as evidence of Germanic superiority in the realm of music, contrasting their volume and majesty in union with gentleness and euphony with the monotone, diatonic melodies of the South.[2] Again, he glories in the flint daggers of the period of the Stone Cists as evidence that already, as early as the close of the Stone Age, the Germans felt a noble pride and joy in weapons.[3]

If we could but dismiss the rhapsodies of Kossinna and his kind as laughable extravagances, the world would indeed be a happier place to-day. Unfortunately, the inordinate preoccupation with Germanic antiquity, which from the time of the Reformation has been so marked a feature of German scholarship,[4] is only one symptom of a deep-seated complaint influencing far more than a coterie of learned men. Even in the utterances of Kossinna we may detect the essential moral

[1] *Ibid.*, 160.

[2] *Die deutsche Vorgeschichte eine hervorragend nationale Wissenschaft*, 29–30.

[3] *Ursprung und Verbreitung der Germanen*, 289 and 302.

[4] The first edition of the *Germania* to be printed in Germany issued from Nuremburg in 1473. It was made available in the vulgar tongue in 1535, when there appeared at Mainz *Das Buchlein von der alten Teutschen Brauch und Leben*. In 1615 Philip Cluver (born at Danzig, 1580; died at Leiden, 1623) published a comprehensive compendium entitled *Germania Antiqua* . . . which aimed to assemble everything from the writings of classical antiquity bearing on the ancient Germans. The book is interesting for its curious illustrations: while at pains to depict the Germans in their rude, native setting, these showed no signs of regarding the material objects dating from German antiquity, which even at that date must occasionally have come to light. It can, however, be said that much of the activity in German pre- and proto-history has, in effect, been a commentary on the *Germania*. The influence of Classical learning on the development of prehistoric studies in other parts of Europe and of the ancient world generally has not always been sufficiently appreciated.

obliquity: it is assumed without question that if only the Germans can prove their cultural 'superiority', they have thereby established a right, even a duty, to dominate and, if necessary, exterminate 'inferior' neighbours, as though strength was given, not to protect and uplift, but to oppress and destroy. The nationalism of the pan-Germanists was a diseased nationalism, a plague which the free nations had sooner or later to stamp out in the interests of the human race.

If, as is lamentably true, the sentiments uniting national societies may be perverted to their own and others' ruin, this does not lessen but rather increases the necessity of union, for it is only through the reconciliation and integration of coherent nations that any world community can be realized in the foreseeable future. The inadequacy of nationalism in no wise lessens the social value, even the social necessity of national sentiment, and it is certain that in ministering to this, archaeology will continue to discharge one of its principal functions. To judge the matter in perspective, it is worth remembering that in archaeology, as in so many other fields of endeavour, the main impetus has hitherto been supplied by regional or national feeling, and the achievement has, in fact, been massive. The great national and local societies of our own and other countries have laid the foundations of archaeology within their own territories and have even in some instances reached out beyond to help in realizing wider aims. The essential point is, surely, that in a liberal world the operation of national or even local sentiment can, within the limits imposed by requirements of order, serve only to enrich society. Only when perverted by men bent on destroying or curtailing freedom do we find national sentiment, and the activities which serve to nourish it, operating to impoverish human society.

When all this has been said, it remains true that in a world threatened as never before by the consequences of war and physical destruction, we have to look beyond the range of

ideas represented by nationalism. The urgent and supreme task of evolving a world order is a responsibility of statesmen, but it can be said with confidence that neither their efforts, nor even the threat of vaporization, will suffice unless, intellectually and morally, mankind is adequately prepared. Even the Fascist ' statesmen ' needed years to deprave their peoples for aggressive war. How much more thorough and prolonged is likely to be the preparation for peace ! In the essential task of enlightenment, archaeology and, more especially, prehistoric archaeology, has a modest but definite part to play.

Archaeology may contribute to the integration of society not only by strengthening local ties and fostering patriotic sentiments, but, if allowed to develop freely, by promoting a fuller realization of the underlying solidarity of the human race, upon which the possibility of a world order ultimately rests. The stress is likely to vary according to the field in which archaeology is applied : for the historic and protohistoric periods, illumined to a greater or less degree by literature, it is inevitable, owing to the influence of language and tradition, that the focus will be on regional loyalties ; whereas for the prehistoric age, and more especially for its more remote periods beyond the range of the earliest traditions of existing societies, the gaze extends to the uttermost limits of human history. It is, therefore, as one of the chief clues to prehistory that archaeology contributes most to the realization of the larger aim : in the dim but immense vistas of unrecorded time the history of nations fades into the prehistory of man.

Archaeology would, indeed, have sufficient claim upon society, if only as a method of study essential to increasing our knowledge of prehistory, for society leans heavily upon the arch of knowledge and, in so far as it bridges the perilous chasm between the humanities and the natural sciences, prehistory is a keystone of that arch. It may be that we owe

some of our ills to the fact that science turned her attention last upon human kind, but thanks largely to Darwin and Huxley, archaeologists have applied themselves in recent generations to the whole range of human history from the birth of savagery up to the full flowering of civilization. At the same, time prehistoric archaeology has aided many of the natural sciences by providing fossils useful for establishing sequence, as in Quaternary Geology, for which palaeolithic flint implements serve as zone fossils. Again, as is becoming more and more apparent, the prehistoric archaeologist can assist the biological sciences by helping to provide explanations for 'natural' phenomena in terms of human activity in the more or less remote past: the rôle of prehistoric man as a factor in the balance of nature is receiving more appreciation from ecologists, while botanists and zoologists have each found prehistoric archaeology of value in helping them to explain the distribution and even, in the case of domesticated species, the evolution of plants and animals.

Particularly intimate, also, has been the relationship between prehistoric archaeology and human palaeontology. Again, it must be remembered that many of the fundamental discoveries of physics, chemistry, mathematics and engineering were made in prehistoric times, to which research on the history of these sciences has necessarily to turn. Thus, prehistoric archaeology, while it reveals the common achievements and essential unity of humanity, at the same time emphasises the interdependence of man and nature. How truly was it written that the Antiquary would least of all be 'deemed an unserviceable member of the community . . . in an age wherein every part of science is advancing to perfection'! Archaeology has established itself as an integral part of the edifice of knowledge, an edifice which, if not continually extended and maintained, would collapse and in its ruin destroy the basis of civilized life. The maintenance of learning and

research at the highest level is no luxury, but a necessary condition for the existence of the modern community.

If so much be accepted, it may be asked how society can best discharge its obligations to archaeology and the other forms of pure research, divorced from material ends, which serve as the lungs of knowledge. Clearly the answer must depend upon existing social circumstances. Until comparatively recently it was possible in civilized communities to rely upon private bounty and private initiative, whether individual or corporate, and such, it may be hoped, will continue to operate even in societies impoverished by two world wars. On the other hand, admirers are not wanting in our own community, of a system under which research is planned and sustained by the State. Deterioration of economic conditions has so penalized private initiative in some countries that there is a danger of this counsel of despair being followed without due appreciation of the penalties. In the case of the late totalitarian regimes of Germany and Italy, avowedly dedicated to aggression, the evils are manifest. What can be said of science as it is planned in the U.S.S.R.?

Soviet Russia has been less fortunate than Nazi Germany in her inheritance. The Nazi totalitarians had the advantage of a large body of specialists trained under the old regime, and of a massive tradition of ordered scholarship. In Russia the tradition was less deeply rooted and much of it was swept away in the revolution. It is perhaps not altogether surprising, therefore, to find that, although provision for the care of sites, for excavations, research institutes, publications and museums has been greatly increased, the results have up to the present been rather disappointing. Considering the size of the country and the scale on which research is subsidized, archaeological discoveries have not been outstanding, despite the finding of traces of Upper Palaeolithic dwellings in the open-air, which after all is not unconnected with the absence over

most of the country of formations naturally productive of caves and rock-shelters. To judge from published illustrations, methods of excavation hardly reach the best Western standards. As for the classification and interpretation of archaeological finds, Soviet prehistorians have been too preoccupied with their duties as propagandists to keep abreast of modern progress. Their energies during the period 1932–37 were largely absorbed in providing 'the historical and social theory for combating the ideas of capitalism, and dissolving the prejudices which survive in the minds of the people, and have been transmitted from earlier forms of society', which was one of the seven subjects selected for investigation during this five-year period by the Academy of Sciences.[1] It seems to be true that Soviet science in general has so far been developed most strongly on the side of application, whether in technology or propaganda, while comparatively little has been achieved in fundamental research.[2]

The most outstanding feature of scientific activity in the Soviet Union is that it is planned from above in accordance with a policy designed to realize certain political aims. The Academy of Sciences of the U.S.S.R. is the chief agency for enforcing and supervising the execution of planning in the realm of scientific research. The comprehensiveness of its scope can be gauged from the titles of its eight departments: physico-mathematical, chemical, geological-geographical, biological, technical sciences, history and philosophy, economics and law, and literature and philology. Of the numerous institutes, which form its research organs, the N.Y. Marr Institute of Material Culture is the one which pursues the possibilities of archaeology. Within the Academy the system of control has been meticulously contrived. The functions of the various institutes are determined by the Presidium or

[1] J. G. Crowther, *Soviet Science*, 25–6. London, 1936.

[2] Dr. John R. Baker, *Science and the Planned State*, 76–82. London, 1945.

standing executive Committee of the Academy, comprising a president, three vice-presidents, secretaries of the eight departments and five academician members. 'It is the duty of the director of an institute to organize all the work of the institute and exercise operative control over the activities of the institute in order to ensure the proper fulfilment of all the tasks placed before the institute. . . .'[1] Within certain limits the director has the right 'to employ, transfer and discharge staff members of the institute at his own discretion', although for senior staff the confirmation of the Presidium is required. He also has the right 'to determine the rights and duties of the scientific, organizational, technical and administrative personnel of the institute' and 'to fix the salaries of the staff members within the limits of the salary fund and the maximum rates established by the staff quota confirmed by the Presidium. . . .' The Academy not only controls the research programmes, appointments and pay of the thousands of workers in its institutes, but through a virtual monopoly of publication it regulates their reports. Under such conditions the 'freedom' of the individual research worker could not, and was not intended to exist. As for the Academy itself, it is significant that admission is only open to 'scientists who have enriched science with works of first-rate importance *and* who have furthered the socialist construction of the U.S.S.R.'. An ardent admirer has defined 'the first duty of the Academy' as being 'to plan and direct the study and application of science towards the fulfilment of Socialist construction, and the further growth of the Socialist order'.[2] . . .Since from the point of view of the Soviet State the main function of the Academy is to subserve the social ends

[1] This and following extracts are quoted by permission from a draft memorandum on 'Organization of Science in the U.S.S.R.', prepared by the Science Section, Society for Cultural Relations with the U.S.S.R.

[2] J. G. Crowther, *op. cit.* 24.

regarded as important by itself, it follows that the pursuit of objective truth must take a secondary and, if necessary, a subservient place. The totalitarian is compelled to reject the existence of objective truth, or at least to deny its value or validity. That eminent authority, Adolf Hitler, has been credited with the observation that ' there is no such thing as truth. Science is a social phenomenon, and like every other social phenomenon is limited by the benefit or injury it confers on the community.' The criterion is no longer what in bourgeois society we are accustomed to call the truth, but convenience or social advantage, as determined by the State. If, however, objective truth is discarded as something outmoded, if not immoral, there is plenty of scope for orthodoxy, which becomes indeed the foundation of the State. The proclamation of orthodoxy and the denunciation of unorthodoxy are complementary functions equally vital to a totalitarian society, which maintains informers and secret police to detect and liquidate those who stray from the narrow path as it is defined at any particular time. It is significant that one of the main functions of the Research Institutes of the Academy of Sciences of the U.S.S.R. is to ' organize and lead the struggle against pseudo-scientific theories and trends in the various fields of knowledge '. In a free society error is eliminated by the free play of discussion as hypothesis is tested by discovery; when the touchstone of objective truth has been discarded and the criterion of ' scientific ' or ' unscientific ' is determined in accordance with considerations extraneous to the pursuit of truth, such as the requirements of political or economic theory, it becomes necessary to devise a special machinery for the purpose, a machinery which naturally rides roughshod over the careers and persons of the scholars and researchers who may happen to stand in its way. The Inquisition is as essential as the Office of Propaganda in a totalitarian society.

To the benighted bourgeois scholar the distinction between

truth and error is rarely clear-cut: he spends his life for the most part assessing various shades of grey; only rarely do flecks of black and white allow him to discern with comparative ease the contours of the truth. His colleague in a totalitarian society is faced with a different problem: for him there is no life search for the truth; his task is merely to interpret his subject in the light of verities already established by superior authority and to combat interpretations which run counter to the ideology currently imposed by the State. Both live in a world of uncertainty, but whereas in the one case this is inherent in the unexpectedness of unfettered research, in the other this may result from changes in the quite extraneous field of political or economic theory. During periods of crisis, when the official line may change rapidly, the zealous intellectual may find himself branded as a heretic for preaching yesterday's orthodoxy.

A carefully documented account of the fate of historians at the hands of the Soviet State has been given us by M. Georges Kagan.[1] Before 1929 a certain latitude was allowed and it was possible for conflicting views to be expressed by different schools of historians, but the situation deteriorated progressively once Stalin had consolidated his position. Evidently accepting the Pokrovski formula, 'l'histoire est la politique renversée dans le passé', Stalin determined to regulate history in conformity with his political views and intentions.[2] This he achieved by enforcing a convenient orthodoxy. After first exterminating non-communist historians, he proceeded to liquidate elements within the party

[1] 'La crise de la science historique russe', *Revue Historique*, T. CLXXXVIII, Jan.–March, 1940, 1–35. The author is obliged to Professor H. Butterfield for this reference.

[2] Thus he was careful to act as chief editor of the Official History of the Russian Revolution published in 1935. Two of the eight editors had been disgraced before the appearance of the French edition in 1937.

of capitalism. The museums, treasuries of innumerable monuments of material culture, representing the labour of hundreds of thousands of generations from primitive men to the builders of socialism, should serve as centres of 'knowledge of the world in order to change it' [Karl Marx].[1] The six-fold increase in museums since the Revolution, many of them erected in outlying parts, has not been carried through in the interests of any academic enlightenment, but rather to demonstrate the triumph of the Leninist-Stalinist national minority policy against the background of the gloomy past of the so-called 'borderlands' under the colonial capitalist regime of Tsarist Russia.

Such language must doubtless be discounted: the use of certain hackneyed phrases as a mark of grace is not confined to circles of Protestant Fundamentalism. Yet it remains symptomatic of the totalitarian mind, which necessarily regards knowledge as something to be used to further political aims, an attitude inconsistent with the integrity of the individual or with the conception of objective truth.

Control of science and learning from the stage of research to that of popularization is an obvious necessity for a totalitarian regime, since freedom is potentially most subversive in the field of intellect. Conversely, it is worth reflecting that so long, and only so long, as this field is kept free and inviolate from control by the State, can those of us who still live in a nominally free country expect to preserve either our own individual freedom or the ideal of objective truth. One does well to ponder Hitler's complaint, 'the slogan of objective science has been coined by the professorate simply in order to escape from the very necessary supervision by the power of the State'.[2] In an era of economic stringency, when the State inevitably extends its control over many fields formerly left to private initiative, it becomes more than ever vital to preserve

[1] See *The Museums Journal*, Vol. 36, No. 1 (April, 1936).
[2] H. Rauschning, *op. cit.*, 221.

the key fortress of intellectual freedom. It is this which makes so dangerous the activities of the 'fifth column' in the body of researchers and university teachers, men who, imbued for the most part with a genuine zeal for objective truth in a limited field, are ready, without always realizing it, to barter the freedom of others for the advancement of their own specialisms. Such men, who can most readily be distinguished by an uncritical admiration for the achievements of the U.S.S.R., appear to regard as an ideal what is, in fact, a desperate expedient, and praise as something to be emulated a state of affairs from which civilized men freed themselves some two and a half millennia past. But, apart from the vital issue of freedom of the individual conscience, there is another objection, equally formidable, to control of research by the State, since *the* State is in fact *a* State : even the Academy of Sciences of the U.S.S.R. is still the Academy of Sciences of Russia. If one of the main functions of learning and science is to emancipate mankind from the tyranny of war, it is difficult to see how this can be advanced by subjecting these activities to the organs of national feeling. Surely, it is only by operating freely in an atmosphere of objective truth, such as prevails in the great centres of learning in the West, that archaeology can help to assuage and direct into useful channels the passions of nationalism. Our hopes for a better future lie rather with such institutions as the British Museum, the Oriental Institute of Chicago or the Peabody Museum of Harvard, which send expeditions to the ends of the earth in the cause of learning.

It may be concluded that archaeology deserves to be cultivated in a free society first and foremost as an end in itself, as a form of that 'disinterested intellectual curiosity' which G. M. Trevelyan[1] has recently proclaimed 'the life blood of real civilization'. The primary task of archaeologists is to

[1] *History and the Reader*, 1945, p. 15.

enlarge and deepen man's knowledge of his own development. The results of their labours, wisely used, may subserve great social ends, fostering love of country and in the end promoting a deeper realization of human solidarity, but the motive of their researches ought to be no more and no less than the acquisition of knowledge. There is a very real sense in which archaeologists can only discharge their highest social function by ignoring society. Certainly it is true that society can expect to profit most from the cultivation of archaeology if the subject is allowed to develop freely and without reference to any extraneous considerations, however worthy in themselves. For this reason any move to entrust the State with a monopoly or even with extensive powers over research in this field ought to be resisted. The proper task of the State in relation to archaeology is the provision of essential services, such as the safeguarding of monuments and sites, the classification and display of archaeological material in public museums and the recording of ancient sites on Ordnance Survey maps. Yet it would be wrong to draw a hard-and-fast line between research and the provision of these services, and it is indeed evident that ampler opportunities should be allowed to archaeologists in public employment; in this respect we have much to learn from the Danes and the Scandinavians, not to mention the Germans and the Swiss. Further, it seems no less essential that, at a time when the cultivated classes are facing economic eclipse, if not extinction, the State ought to share the burden of maintaining civilization by subsidizing the arts and fields of study, economically useless, but culturally valuable, such as archaeology. If society is to remain free as well as equalitarian, and civilized as well as free from want, it may be necessary, as in France, to support private associations from public funds, while refraining from restrictive control. One may end by reflecting that the standing of archaeology within a society is one index of its degree of civilization.

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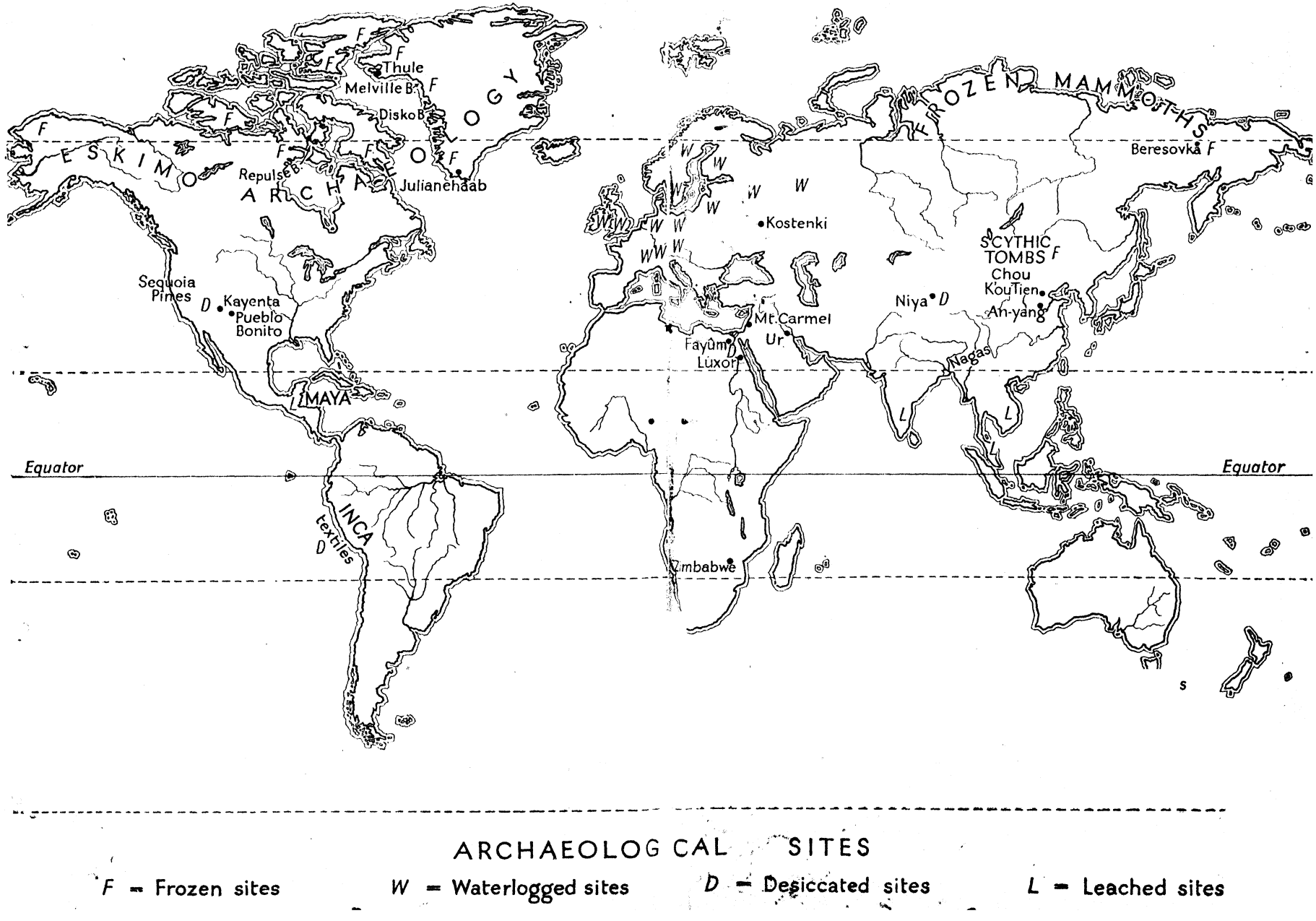
Printed in Great Britain by Jarrold & Sons, Ltd., Norwich



ARCHAEOLOGICAL SITES

F = Frozen sites W = Waterlogged sites D = Desiccated sites L = Leached sites